United States Department of Agriculture

Natural Resources Conservation Service

Iowa Department of Agriculture and Land Stewardship

IOWA STATE UNIVERSITY
Iowa Agriculture and Home Economics Experiment Station

IOWA STATE UNIVERSITY
University Extension

In cooperation with Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship; and Clay County Conference Board

# Soil Survey of Clay County, Iowa

# NRCS Accessibility Statement

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# How To Use This Soil Survey

**General Soil Map**

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

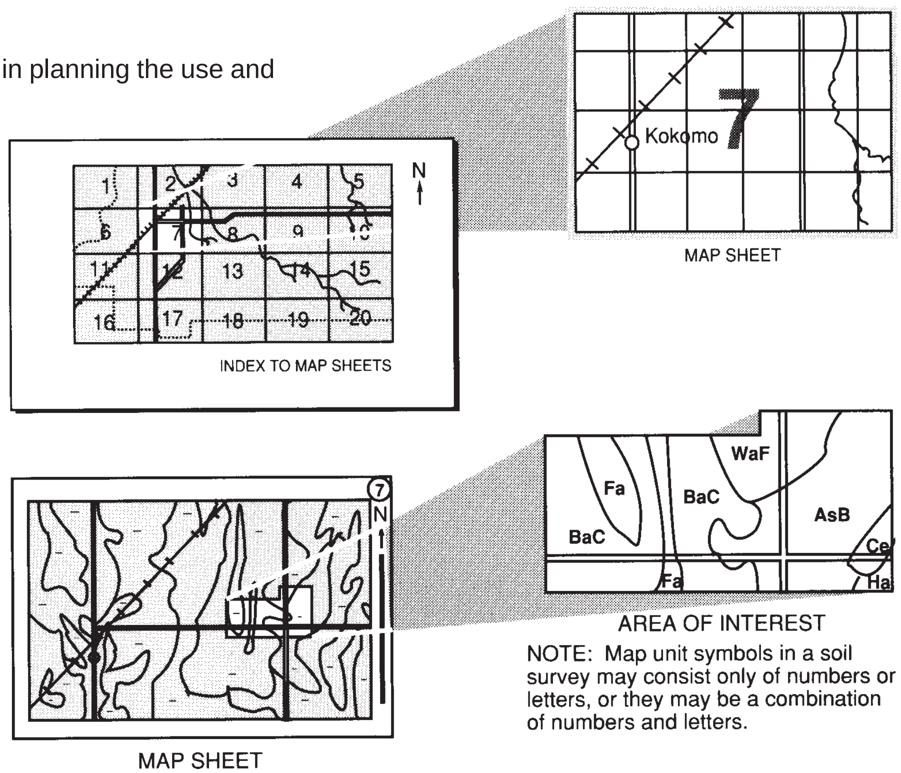
**Detailed Soil Maps**

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.




NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1999. Soil names and descriptions were approved in 2002. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2002. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and the Cooperative Extension Service, Iowa State University; the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship; and the Clay County Conference Board. The survey is part of the technical assistance furnished to the Clay County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.



**Cover: A grassed waterway in a nearly level to gently sloping area of Sac, McCreath, and Afton soils. These soils are well suited to the production of corn, but water erosion is a slight hazard.**

*Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.*

# Contents

Issued 2005

# Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Richard W. Van Klaveren
State Conservationist
Natural Resources Conservation Service

# Where To Get Updated Information

The soil properties and interpretations included in this survey were current as of April 2003. More current information may be available from the Natural Resources Conservation Service (NRCS) Field Office Technical Guide at Spencer, Iowa, or online at www.nrcs.usda.gov/technical/efotg. The data in the Field Office Technical Guide are updated periodically.

More current information may also be available through the NRCS Soil Data Mart Website at http://soildatamart.nrcs.usda.gov/

Additional information about soils and about NRCS is available through the Iowa NRCS Web page at www.ia.nrcs.usda.gov.

For further information, please contact:

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# Soil Survey of
# Clay County, Iowa

By Robin Wisner, Natural Resources Conservation Service

Fieldwork by Joseph Falkenberg, Joe Johnson, and Richard Lensch, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Iowa Agriculture and Home Economics Experiment Station and the Cooperative Extension Service, Iowa State University; the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship; and the Clay County Conference Board

CLAY COUNTY is in northwestern Iowa (fig. 1). It has a total area of 366,400 acres, or 572 square miles. Spencer, the county seat, is in the north-central part of the county.

The county is mainly agricultural. The principal crops are corn and soybeans, but oats, grasses, and legumes are grown for hay and pasture. The raising of livestock is also an important source of income in the county. The major livestock are hogs, cow-calf herds, and poultry. Some dairy cattle also are raised. A very small acreage along the Little Sioux River and its tributaries is used as woodland or woodland pasture. Nonagricultural industries are becoming increasingly important in the county.

This survey updates an earlier survey of Clay County published in 1969 (Fisher, 1969). It provides additional information and has larger maps, which show the soils in greater detail.

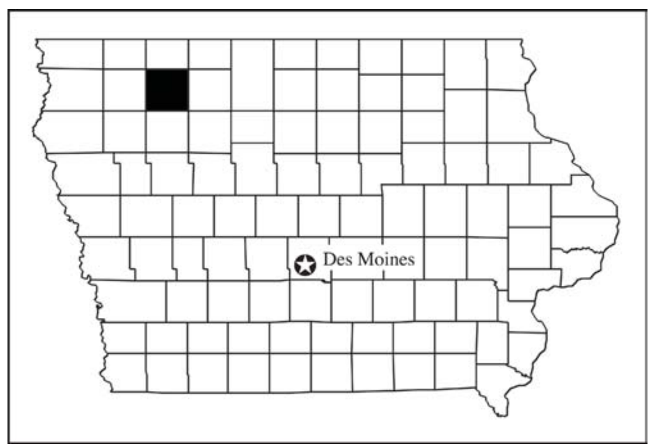


**Figure 1.—Location of Clay County in Iowa.**

## General Nature of the Survey Area

This section provides some general information about Clay County. It describes history; industry, transportation facilities, and recreation; physiography, drainage, and geology; and climate.

### History

The first European settlers in the survey area arrived in 1856, when Christian Kirchner and Ambros S. Mead settled in what is now southwestern Clay County. Several other families moved into the same area later in the same year. Clay County was originally part of Woodbury County, but it was established as a separate county with elected officials in 1858. Since most residents lived in the southwest corner of the county, the town of Peterson was selected as the first county seat. In 1871, the county seat was moved to Spencer. By 1880, the population of Clay County had grown to 4,248; by 1920, it had grown to about 15,600. The population growth rate began to slow after 1920. According to the 2000 U.S. Census, the population of

the county is 17,372 (Iowa State University, 2002). Spencer has a population of 11,317 and is the largest city in the county.

## Industry, Transportation Facilities, and Recreation

Clay County is primarily rural, and the vast majority of the land is dedicated to farming. In 1997, Clay County had 285,829 acres of farmland on 668 farms (Iowa State University, 2002). Corn, soybeans, oats, and grass-legume hay accounted for 262,903 acres of the farmland in production. The rest of the acreage was used primarily for pasture or woodland or was idle land. In recent years, the number of farms in the county has been decreasing and the average size of farms increasing. Livestock production is becoming more specialized; many farmers raise only one class of livestock. In recent years, the number of total confinement livestock systems has been increasing, particularly those raising swine or poultry. There are many agriculture-related industries throughout the county, including an extensive rural water supplier. Grain elevator facilities are in most communities.

The largest employers in the county are nonfarm industries, including the service industries and retail trade. The county has manufacturers of hydrostatic transmissions and hydraulic pumps, several skilled machining and metal fabrication companies, and a large offset printing company. Many other smaller industries, particularly in Spencer, are major contributors to the local economy of Clay County.

Two major highways divide Clay County. U.S. Highway 18 crosses from east to west, and U.S. Highway 71 crosses from north to south. These two highways intersect in the city of Spencer. Hard-surface state and county roads connect these highways to all of the other communities in the county and surrounding area and to many of the farms. Most farms, however, are on gravel roads with access to the hard-surface roads. One railroad provides rail service to the towns of Dickens, Spencer, and Everly along U.S. Highway 18. The county has one municipal airport, which is about 2 miles west of Spencer. Motor freight lines serve every trading center in the county.

Many parks and Little Sioux River access areas have been established throughout Clay County. Wanata State Park is near the town of Peterson, and Kindlespire Little Sioux River Access is about 5 miles west of Webb. The lakes, rivers, and streams in the county provide excellent potential for recreational activities, such as hunting, fishing, fur trapping, and water sports. Barringer Slough, Dan Green Slough, and Lost Island Lake in the northeastern part of the county are a few of the natural areas. Wooded areas along rivers and streams, many natural and constructed wetlands, and farm windbreaks provide important habitat for wildlife. The county typically has a good population of upland game birds, such as ringneck pheasant, Hungarian partridge, and wild turkey. A number of small ponds are stocked with smallmouth bass, bluegill, and other game fish and thus provide excellent fishing opportunities. Whitetail deer are typically plentiful, and hunting them is a popular recreational activity, particularly in the wooded, steep and very steep areas along the Little Sioux River.

## Physiography, Drainage, and Geology

The topography in Clay County is somewhat divided between the older erosion surface in the western two-thirds of the county and the geologically immature eastern one-third. The Little Sioux River basically dissects these two areas. The former is referred to by soil scientists as Major Land Resource Area (MLRA) 107 and is evidenced by broad, nearly level upland divides and by more sloping areas along the major streams (USDA, 1981). The eastern one-third of the county is referred to as MLRA 103 and is evidenced by rolling topography with a large number of potholes and depressions in the uplands and by steep and very steep topography along the major streams.

Till underlies all of the soils in Clay County and is the greatest influence on the development of the drainage patterns throughout the county. In the MLRA 107 area, the till is predominantly overlain with loess. The older age of these materials has allowed the formation of a more defined drainage system. The younger glacial soils in MLRA 103, which actually buried the loess-capped older till soils, have a much less defined drainage pattern. Two types of moraine topography are evident in the MLRA 103 area. One is a complex of short uneven slopes that have many small indistinct drainage patterns. The other type of moraine topography is broad flat areas between narrow recessional moraines. These broad flat areas have many depressions that range in size from less than an acre to larger than 600 acres. Elk Lake, Round Lake, and Mud Lake are examples of the larger depressions. Limestone bedrock is very deep beneath the till in the area of Clay County and has little or no influence on the developing drainage patterns.

The Ocheyedan and Little Sioux Rivers and their tributaries drain most of Clay County. The Ocheyedan River flows from near the border with Minnesota in Osceola County southeast to Spencer, where it meets the Little Sioux River. The Little Sioux River also

begins near the Minnesota border. It flows nearly straight south and picks up drainage from the Okoboji and Spirit Lake watersheds in Dickinson County and in Clay County west of Fostoria. The Little Sioux River flows slightly east-southeast below Spencer; near Gillett Grove it turns dramatically westward through Peterson towards the Missouri River. It is believed that the Little Sioux River at one time drained towards the Mississippi River, possibly in the Raccoon River watershed. That flow was diverted when glacial ice and debris plugged the valley and created a glacial lake in the area that is now Spencer. When the debris dam broke through, the drainage followed the new path. Stoney Creek drains part of northwestern Clay County and joins the Ocheyedan River east of Everly. Pickerel Run and Lost Island Outlet drain part of northeastern Clay County and join the Little Sioux River at Gillett Grove. Willow Creek drains most of southwestern Clay County. It flows southeast and joins the Little Sioux River just northeast of Cornell, Iowa. Most of these rivers and streams have experienced periods of great flooding, have eroded deep into the till, and in some areas have left sand- and gravel-based terraces above each stage of downcutting.

## Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Spencer in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 17.6 degrees F and the average daily minimum temperature is 8 degrees. The lowest temperature on record, which occurred at Spencer on January 12, 1912, was -38 degrees. In summer, the average temperature is 70.8 degrees and the average daily maximum temperature is 82.5 degrees. The highest temperature, which occurred at Spencer on July 17, 1936, was 113 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is 28.50 inches. Of this total, 18.80 inches, or about 66 percent, usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.01 inches recorded at Spencer on September 7, 1964. Thunderstorms occur on about 44 days each year, and most occur between May and August.

The average seasonal snowfall is 27.1 inches. The greatest snow depth at any one time during the period of record was 33 inches recorded on February 27, 1962. On an average, 45 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 14 inches recorded on March 3, 1977.

The average relative humidity in midafternoon is about 70 percent in December and about 50 percent in April. Humidity is higher at night, and the average at dawn is about 80 percent (70 percent in April and May). The sun shines about 70 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the northwest from November to April and from the south in all other months. Average windspeed is highest, around 13 miles per hour, in April.

# How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

# General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## 1. McCreath-Gillett Grove-Sac Association

*Nearly level to moderately sloping, moderately well drained to poorly drained, silty soils that formed in loess overlying Wisconsin (Tazewell) till; on uplands (fig. 2)*

### *Setting*

*Landform and position on the landform:* Broad upland flats; knolls and rises
*Slope range:* 0 to 9 percent

### *Composition*

*Extent of the association in the survey area:* 17 percent
*Extent of the components in the association:*
McCreath soils—40 percent
Gillett Grove soils—30 percent
Sac soils—13 percent
Soils of minor extent—17 percent

### *Soil Properties and Qualities*

**McCreath**

*Drainage class:* Somewhat poorly drained
*Landform and position on the landform:* Upland divides
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

**Gillett Grove**

*Drainage class:* Poorly drained
*Landform and position on the landform:* Broad upland flats
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

**Sac**

*Drainage class:* Moderately well drained
*Landform and position on the landform:* Summits and hillslopes on uplands
*Slope range:* 2 to 9 percent
*Texture of the surface layer:* Silty clay loam

### *Soils of Minor Extent*

- Afton, Annieville, Galva, and Roine soils

### *Use and Management*

*Major use:* Cropland
*Major management considerations:* McCreath and Gillett Grove—wetness, maintaining fertility; Sac—erosion, maintaining fertility

## 2. Wilmonton-Ransom-Afton Association

*Nearly level to gently sloping, somewhat poorly drained and poorly drained, loamy and silty soils that formed in loamy pedisediments overlying calcareous till and in loess overlying Wisconsin (Tazewell) till; on uplands*

### *Setting*

*Landform and position on the landform:* Upland flats; ridges and side slopes
*Slope range:* 0 to 3 percent

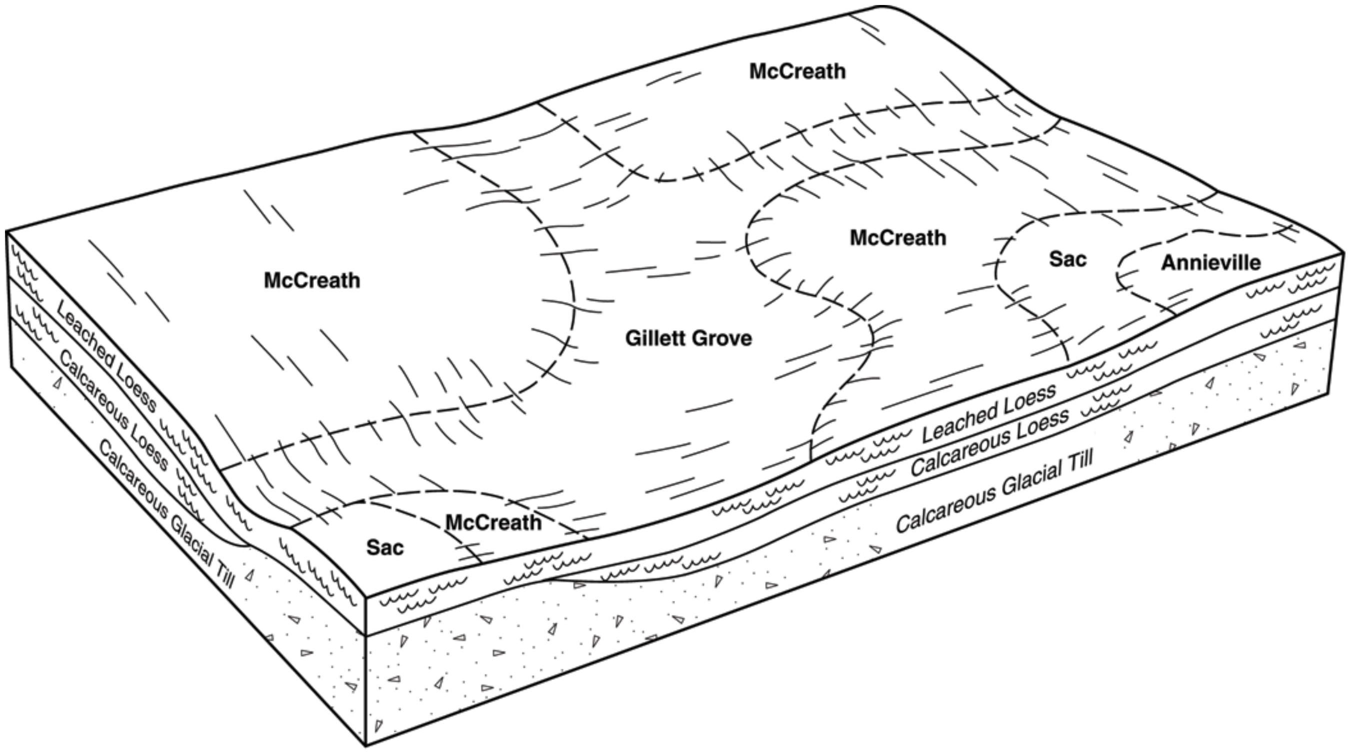


**Figure 2.—Typical pattern of soils and underlying material in the McCreath-Gillett Grove-Sac association.**

### *Composition*

*Extent of the association in the survey area:* 20 percent
*Extent of the components in the association:*
Wilmonton soils—19 percent
Ransom soils—17 percent
Afton soils—10 percent
Soils of minor extent—54 percent

### *Soil Properties and Qualities*

**Wilmonton**

*Drainage class:* Somewhat poorly drained
*Landform and position on the landform:* Broad upland flats
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Silty clay loam and clay loam

**Ransom**

*Drainage class:* Somewhat poorly drained
*Landform and position on the landform:* Broad upland flats
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Silty clay loam

**Afton**

*Drainage class:* Poorly drained
*Landform and position on the landform:* Upland drainageways
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

### *Soils of Minor Extent*

- Colo, Everly, Galva, Gillett Grove, McCreath, Moneta, and Sac soils

### *Use and Management*

*Major use:* Cropland
*Major management considerations:* Wetness, maintaining fertility

## 3. Moneta-Cornell Association

*Strongly sloping to very steep, well drained and moderately well drained, loamy and silty soils that formed in calcareous Wisconsin (Tazewell) till and in loess and loamy sediments overlying calcareous Wisconsin (Tazewell) till; on uplands*

### *Setting*

*Landform and position on the landform:* Side slopes in valleys
*Slope range:* 9 to 40 percent

### *Composition*

*Extent of the association in the survey area:* 6 percent
*Extent of the components in the association:*
Moneta soils—64 percent
Cornell soils—1 percent
Soils of minor extent—35 percent

### *Soil Properties and Qualities*

**Moneta**

*Drainage class:* Well drained
*Slope range:* 9 to 40 percent
*Texture of the surface layer:* Loam

**Cornell**

*Drainage class:* Moderately well drained
*Slope range:* 18 to 25 percent
*Texture of the surface layer:* Silty clay loam

### *Soils of Minor Extent*

- Everly and Terril soils

### *Use and Management*

*Major uses:* Cropland and pasture
*Major management considerations:* Moneta—erosion, calcareous surface layer, maintaining fertility; Cornell—erosion, maintaining fertility

## 4. Wadena-Cylinder-Biscay Association

*Nearly level to gently sloping, well drained to poorly drained, loamy soils that formed in loamy alluvium underlain by sand and gravel; on stream terraces and outwash plains*

### *Setting*

*Landform:* Stream terraces and outwash plains
*Slope range:* 0 to 5 percent

### *Composition*

*Extent of the association in the survey area:* 15 percent
*Extent of the components in the association:*
Wadena soils—41 percent
Cylinder soils—19 percent
Biscay soils—16 percent
Soils of minor extent—24 percent

### *Soil Properties and Qualities*

**Wadena**

*Drainage class:* Well drained
*Landform and position on the landform:* Flats and risers on stream terraces
*Slope range:* 0 to 5 percent
*Texture of the surface layer:* Loam

**Cylinder**

*Drainage class:* Somewhat poorly drained
*Landform:* Stream terraces and outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam

**Biscay**

*Drainage class:* Poorly drained
*Landform:* Stream terraces and outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam

### *Soils of Minor Extent*

- Coland, Dickinson, Spillville, and Talcot soils

### *Use and Management*

*Major use:* Cropland
*Major management considerations:* Wadena—erosion, droughtiness, maintaining fertility; Cylinder and Biscay—wetness, maintaining fertility

## 5. Colo-Zook-Spillville Association

*Nearly level, somewhat poorly drained and poorly drained soils that formed in silty and loamy alluvium; on bottom land*

### *Setting*

*Landform:* Bottom land
*Slope range:* 0 to 2 percent

### *Composition*

*Extent of the association in the survey area:* 4 percent
*Extent of the components in the association:*
Colo soils—24 percent
Zook soils—4 percent
Spillville soils—4 percent
Soils of minor extent—68 percent

### *Soil Properties and Qualities*

**Colo**

*Drainage class:* Poorly drained
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

**Zook**

*Drainage class:* Poorly drained
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

**Spillville**

*Drainage class:* Somewhat poorly drained
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam

### *Soils of Minor Extent*

- Calco soils and the channeled Coland and Colo soils

### *Use and Management*

*Major uses:* Cropland and wetlands
*Major management considerations:* Colo—flooding, wetness; Zook—flooding, wetness, restricted permeability; Spillville—flooding (fig. 3)

## 6. Everly-Letri-Fostoria Association

*Nearly level to strongly sloping, moderately well drained to poorly drained, loamy soils that formed in eolian material and pedisediments overlying till; on uplands*

### *Setting*

*Position on the landform:* Ridges and side slopes
*Slope range:* 0 to 14 percent

**Figure 3.—Manmade drainage ditches help to lower the water table and control flooding on the nearly level flood plains in areas of the Colo-Zook-Spillville association.**

### Composition

*Extent of the association in the survey area:* 10 percent
*Extent of the components in the association:*
Everly soils—58 percent
Letri soils—32 percent
Fostoria soils—6 percent
Soils of minor extent—4 percent

### Soil Properties and Qualities

**Everly**

*Drainage class:* Moderately well drained
*Position on the landform:* Summits of ridges and side slopes
*Slope range:* 2 to 14 percent
*Texture of the surface layer:* Clay loam

**Letri**

*Drainage class:* Poorly drained
*Position on the landform:* Flats
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam

**Fostoria**

*Drainage class:* Somewhat poorly drained
*Position on the landform:* Flats and low rises
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Loam

### Soils of Minor Extent

- Dickinson, May City, and Ocheyedan soils

### Use and Management

*Major use:* Cropland
*Major management considerations:* Everly—erosion, maintaining fertility; Letri and Fostoria—wetness, maintaining fertility

## 7. Clarion-Nicollet-Webster Association

*Nearly level to moderately sloping, moderately well drained to poorly drained, loamy soils that formed in till or in local alluvium derived from till; on uplands (fig. 4)*

### Setting

*Landform and position on the landform:* Nearly level to moderately sloping upland flats; knolls and rises on glacial ground moraines
*Slope range:* 0 to 9 percent

### Composition

*Extent of the association in the survey area:* 25 percent
*Extent of the components in the association:*
Clarion soils—40 percent
Nicollet soils—18 percent
Webster soils—15 percent
Soils of minor extent—27 percent

### Soil Properties and Qualities

**Clarion**

*Drainage class:* Moderately well drained
*Position on the landform:* Knolls and rises
*Slope range:* 2 to 9 percent
*Texture of the surface layer:* Loam

**Nicollet**

*Drainage class:* Somewhat poorly drained
*Position on the landform:* Flats and slight rises
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Loam

**Webster**

*Drainage class:* Poorly drained
*Position on the landform:* Flats and swales
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam

### Soils of Minor Extent

- Canisteo, Harps, Knoke, Okoboji, and Storden soils

### Use and Management

*Major use:* Cropland
*Major management considerations:* Clarion—erosion, maintaining fertility; Nicollet—wetness, erosion, maintaining fertility; Webster—wetness, maintaining fertility

## 8. Belmann-Fostoria, lacustrine substratum-Waldorf Association

*Nearly level to gently sloping, poorly drained and somewhat poorly drained, silty and loamy soils that formed in lacustrine sediments and in local alluvium overlying lacustrine sediments; on glacial lake plains*

### Setting

*Landform:* Glacial lake plains
*Slope range:* 0 to 3 percent

### Composition

*Extent of the association in the survey area:* 3 percent
*Extent of the components in the association:*
Belmann soils—24 percent
Fostoria, lacustrine substratum—20 percent

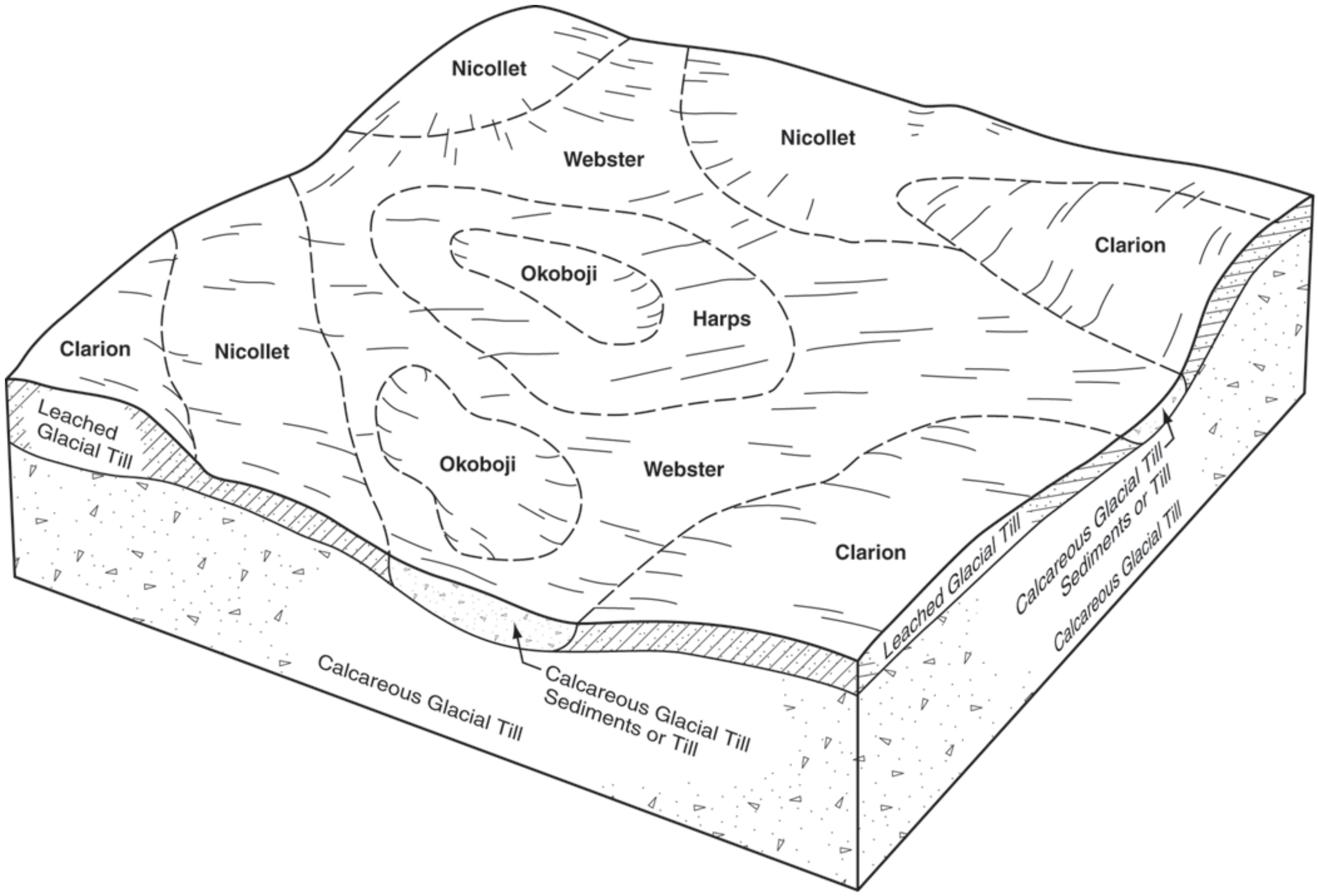


**Figure 4.—Typical pattern of soils and underlying material in the Clarion-Nicollet-Webster association.**

Waldorf soils—19 percent
Soils of minor extent—37 percent

## *Soil Properties and Qualities*

### Belmann

*Drainage class:* Poorly drained
*Position on the landform:* Flats
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam

### Fostoria, lacustrine substratum

*Drainage class:* Somewhat poorly drained
*Position on the landform:* Flats and low rises
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Clay loam

### Waldorf

*Drainage class:* Poorly drained
*Position on the landform:* Flats and swales
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay

## *Soils of Minor Extent*

- Belmann, gypsum phase; Dickinson and Ocheyedan soils that have a lacustrine substratum; and Ocheda soils

## *Use and Management*

*Major use:* Cropland
*Major management considerations:* Belmann—wetness, gypsum, maintaining fertility; Fostoria and Waldorf—wetness, maintaining fertility

# Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting additional components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal soil properties and features to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Fostoria clay loam, lacustrine substratum, 1 to 3 percent slopes, is a phase of the Fostoria series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, sand and gravel, is an example.

Table 4 gives the acreage and proportionate extent

of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## 6—Okoboji silty clay loam, depressional, 0 to 1 percent slopes

### *Component Description*

**Okoboji and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Silty alluvium washed from till
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.3 inches
*Content of organic matter in the upper 10 inches:* 8.3 percent

### *Additional Components*

Knoke soils: 5 to 10 percent of the unit
Harps soils: 3 to 7 percent of the unit
Okoboji mucky silty clay loam: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 27B—Terril loam, 2 to 5 percent slopes

### *Component Description*

**Terril and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Drainageways, alluvial fans
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Local loamy alluvium and/or colluvium
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 3.4 percent

### *Additional Components*

Spillville soils: 5 to 15 percent of the unit
Clarion soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 27C—Terril loam, 5 to 9 percent slopes

### *Component Description*

**Terril and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Drainageways, alluvial fans
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Local loamy alluvium and/or colluvium
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 3.4 percent

### *Additional Components*

Spillville soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 27D—Terril loam, 9 to 14 percent slopes

### *Component Description*

**Terril and similar soils**

*Extent:* 65 to 85 percent of the unit
*Geomorphic setting:* Drainageways
*Slope range:* 9 to 14 percent

*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Local loamy alluvium and/or colluvium
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 3.4 percent

### *Additional Components*

Coland soils: 0 to 10 percent of the unit
Spillville soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 31—Afton silty clay loam, 0 to 2 percent slopes

### *Component Description*

**Afton and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Drainageways on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loess and alluvium overlying till
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 10.4 inches
*Content of organic matter in the upper 10 inches:* 5.8 percent

### *Additional Components*

Afton, frequently flooded: 5 to 15 percent of the unit
Gillett Grove soils: 5 to 10 percent of the unit
McCreath soils: 0 to 5 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 34B—Estherville sandy loam, 2 to 5 percent slopes

### *Component Description*

**Estherville and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 4.1 inches
*Content of organic matter in the upper 10 inches:* 1.6 percent

### *Additional Components*

Hawick soils: 5 to 15 percent of the unit
Wadena soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 41C—Sparta loamy sand, 5 to 9 percent slopes

### *Component Description*

**Sparta and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Loamy sand
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Parent material:* Eolian sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 4.2 inches

*Content of organic matter in the upper 10 inches:* 1.5 percent

### *Additional Components*

Dickinson soils: 0 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 48—Knoke mucky silty clay loam, depressional, 0 to 1 percent slopes

### *Component Description*

**Knoke and similar soils**

*Extent:* 80 to 90 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Silty alluvium washed from till
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.5 inches
*Content of organic matter in the upper 10 inches:* 8.6 percent

### *Additional Components*

Knoke silty clay loam: 0 to 15 percent of the unit
Harps soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 54—Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded

### *Component Description*

**Zook and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Silty alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 9.2 inches
*Content of organic matter in the upper 10 inches:* 5.4 percent

### *Additional Components*

Coland soils: 5 to 15 percent of the unit
Colo soils: 0 to 10 percent of the unit
Spillville soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 55—Nicollet loam, 1 to 3 percent slopes

### *Component Description*

**Nicollet and similar soils**

*Extent:* 60 to 90 percent of the unit
*Geomorphic setting:* Rises on ground moraines
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 10.9 inches
*Content of organic matter in the upper 10 inches:* 5.5 percent

### *Additional Components*

Clarion soils: 5 to 12 percent of the unit
Crippin soils: 0 to 10 percent of the unit
Rolfe soils: 0 to 10 percent of the unit
Webster soils: 0 to 7 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 62F—Storden loam, 18 to 25 percent slopes

### *Component Description*

**Storden and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 18 to 25 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 2.4 percent

### *Additional Components*

Sunburg soils: 5 to 15 percent of the unit
Omsrud, moderately eroded: 5 to 10 percent of the unit
Terril soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Hayland and pasture (fig. 5)

## 77B—Sac silty clay loam, 2 to 5 percent slopes

### *Component Description*

**Sac and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Ridges on uplands
*Slope range:* 2 to 5 percent

**Figure 5.—Livestock pasture in an area of Storden loam, 18 to 25 percent slopes.**

*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loess overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 3.6 percent

### *Additional Components*

Annieville soils: 5 to 12 percent of the unit
McCreath soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 77C—Sac silty clay loam, 5 to 9 percent slopes

### *Component Description*

**Sac and similar soils**

*Extent:* 77 to 90 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loess overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 3.6 percent

### *Additional Components*

Annieville soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 77C2—Sac silty clay loam, 5 to 9 percent slopes, moderately eroded

### *Component Description*

**Sac, moderately eroded, and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loess overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 2.6 percent

### *Additional Components*

Annieville soils: 0 to 10 percent of the unit
McCreath soils: 5 to 15 percent of the unit
Ransom soils: 0 to 5 percent of the unit
Sac soils that are only slightly eroded: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 90—Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes

### *Component Description*

**Okoboji mucky silty clay loam and similar soils**

*Extent:* 80 to 90 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Mucky silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Silty alluvium washed from till
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface

*Available water capacity to a depth of 60 inches:* 11.8 inches
*Content of organic matter in the upper 10 inches:* 13.7 percent

### *Additional Components*

Harps soils: 5 to 10 percent of the unit
Knoke soils: 0 to 10 percent of the unit
Okoboji silty clay loam: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 95—Harps loam, 0 to 2 percent slopes

### *Component Description*

**Harps and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Rims of depressions on ground moraines
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Calcareous till or till-derived sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 10.9 inches
*Content of organic matter in the upper 10 inches:* 4.7 percent

### *Additional Components*

Canisteo soils: 5 to 10 percent of the unit
Crippin soils: 0 to 10 percent of the unit
Okoboji soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 107—Webster silty clay loam, 0 to 2 percent slopes

### *Component Description*

**Webster and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Swales on ground moraines; flats on ground moraines
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Calcareous till or till-derived sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 10.9 inches
*Content of organic matter in the upper 10 inches:* 6.1 percent

### *Additional Components*

Canisteo soils: 5 to 15 percent of the unit
Nicollet soils: 5 to 10 percent of the unit
Okoboji soils: 0 to 5 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 108—Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes

### *Component Description*

**Wadena and similar soils**

*Extent:* 60 to 85 percent of the unit
*Geomorphic setting:* Outwash plains, stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loamy sediments over sand or gravel (fig. 6)
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.9 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### *Additional Components*

Wadena soils that are 32 to 40 inches to sand and gravel: 10 to 20 percent of the unit
Cylinder soils: 5 to 10 percent of the unit
Estherville soils: 0 to 10 percent of the unit

**Figure 6.—Areas of Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes, provide an economical source of sand and gravel.**

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 108B—Wadena loam, 24 to 32 inches to sand and gravel, 2 to 5 percent slopes

### *Component Description*

**Wadena and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Outwash plains, stream terraces
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loamy sediments over sand or gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.7 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### *Additional Components*

Wadena soils that are 32 to 40 inches to sand and gravel: 5 to 15 percent of the unit
Ridgeport soils: 5 to 10 percent of the unit
Wadena soils that have slopes of 0 to 2 percent: 5 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 133—Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded

### Component Description

**Colo and similar soils**

*Extent:* 60 to 90 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Silty alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.4 inches
*Content of organic matter in the upper 10 inches:* 5.7 percent

### Additional Components

Zook soils: 5 to 15 percent of the unit
Spillville soils: 0 to 15 percent of the unit
Calco soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 135—Coland clay loam, 0 to 2 percent slopes, occasionally flooded

### Component Description

**Coland and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11.4 inches
*Content of organic matter in the upper 10 inches:* 5.7 percent

### Additional Components

Spillville soils: 5 to 15 percent of the unit
Havelock soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 138B—Clarion loam, 2 to 5 percent slopes

### Component Description

**Clarion and similar soils**

*Extent:* 60 to 95 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### Additional Components

Nicollet soils: 5 to 15 percent of the unit
Clarion, moderately eroded: 0 to 10 percent of the unit
Storden soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 138C2—Clarion loam, 5 to 9 percent slopes, moderately eroded

### Component Description

**Clarion, moderately eroded, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 5 to 9 percent

*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.8 inches
*Content of organic matter in the upper 10 inches:* 2.4 percent

### *Additional Components*

Clarion soils that are only slightly eroded: 5 to 15 percent of the unit
Terril soils: 5 to 10 percent of the unit
Storden soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 175—Dickinson fine sandy loam, 0 to 2 percent slopes

### *Component Description*

**Dickinson and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Fine sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Eolian sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.4 inches
*Content of organic matter in the upper 10 inches:* 2.5 percent

### *Additional Components*

Dickman soils: 5 to 10 percent of the unit
Ridgeport soils: 5 to 15 percent of the unit
Wadena soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 175B—Dickinson fine sandy loam, 2 to 5 percent slopes

### *Component Description*

**Dickinson and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces, uplands
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Fine sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Eolian sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.4 inches
*Content of organic matter in the upper 10 inches:* 1.9 percent

### *Additional Components*

Dickman soils: 5 to 20 percent of the unit
Ridgeport soils: 5 to 15 percent of the unit
Wadena soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 191—Rushmore silty clay loam, 0 to 2 percent slopes

### *Component Description*

**Rushmore and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loess over till
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 6 percent

### Additional Components

Ransom soils: 5 to 15 percent of the unit
Gillett Grove soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 201B—Coland-Terril complex, 1 to 5 percent slopes

### Component Description

**Coland and similar soils**

*Extent:* 50 to 57 percent of the unit
*Geomorphic setting:* Drainageways
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11.4 inches
*Content of organic matter in the upper 10 inches:* 5.7 percent

**Terril and similar soils**

*Extent:* 30 to 38 percent of the unit
*Geomorphic setting:* Alluvial fans, drainageways
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Local loamy alluvium and/or colluvium
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 3.5 percent

### Additional Components

Spillville soils: 5 to 15 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 202—Cylinder loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes

### Component Description

**Cylinder, 24 to 32 inches to sand and gravel, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces, outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 6.2 inches
*Content of organic matter in the upper 10 inches:* 4.1 percent

### Additional Components

Biscay soils that are 24 to 32 inches to sand and gravel: 5 to 15 percent of the unit
Cylinder soils that are 32 to 40 inches to sand and gravel: 5 to 15 percent of the unit
Wadena soils that are 24 to 32 inches to sand and gravel: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 203—Cylinder loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes

### Component Description

**Cylinder, 32 to 40 inches to sand and gravel, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces, outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None

*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 6.5 inches
*Content of organic matter in the upper 10 inches:* 4.1 percent

### Additional Components

Biscay soils that are 32 to 40 inches to sand and gravel: 5 to 15 percent of the unit
Cylinder soils that are 24 to 32 inches to sand and gravel: 5 to 15 percent of the unit
Wadena soils that are 24 to 32 inches to sand and gravel: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 221—Klossner muck, depressional, 0 to 1 percent slopes

### Component Description

**Klossner and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Muck
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Well decomposed organic material and the underlying loamy material
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 16.5 inches
*Content of organic matter in the upper 10 inches:* 35 percent

### Additional Components

Harps soils: 5 to 10 percent of the unit
Okoboji soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Wildlife habitat

## 259—Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes

### Component Description

**Biscay and similar soils**

*Extent:* 55 to 85 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 7.8 inches
*Content of organic matter in the upper 10 inches:* 5.6 percent

### Additional Components

Biscay soils that are 24 to 32 inches to sand and gravel: 10 to 20 percent of the unit
Cylinder soils: 5 to 15 percent of the unit
Biscay, depressional: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 274—Rolfe silt loam, depressional, 0 to 1 percent slopes

### Component Description

**Rolfe and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Silt loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Till-derived sediments and till
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface

*Available water capacity to a depth of 60 inches:* 9.6 inches
*Content of organic matter in the upper 10 inches:* 5 percent

#### *Additional Components*

Webster soils: 5 to 15 percent of the unit
Okoboji soils: 0 to 10 percent of the unit

#### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 282—Ransom silty clay loam, 1 to 3 percent slopes

#### *Component Description*

**Ransom and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Rises on uplands
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loess over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.9 inches
*Content of organic matter in the upper 10 inches:* 4.4 percent

#### *Additional Components*

McCreath soils: 5 to 15 percent of the unit
Gillett Grove soils: 0 to 10 percent of the unit

#### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 308—Wadena loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes

#### *Component Description*

**Wadena, 32 to 40 inches to sand and gravel, and similar soils**

*Extent:* 60 to 85 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loamy sediments over sand or gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 7.1 inches
*Content of organic matter in the upper 10 inches:* 3.3 percent

#### *Additional Components*

Wadena soils that are 24 to 32 inches to sand and gravel: 10 to 20 percent of the unit
Cylinder soils that are 32 to 40 inches to sand and gravel: 5 to 10 percent of the unit
Ridgeport soils: 0 to 10 percent of the unit

#### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 308B—Wadena loam, 32 to 40 inches to sand and gravel, 2 to 5 percent slopes

#### *Component Description*

**Wadena, 32 to 40 inches to sand and gravel, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loamy sediments over sand or gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 6.9 inches
*Content of organic matter in the upper 10 inches:* 3.3 percent

#### *Additional Components*

Wadena soils that are 24 to 32 inches to sand and gravel: 10 to 12 percent of the unit
Cylinder soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 354—Aquolls (marsh), ponded, 0 to 1 percent slopes

### *Component Description*

**Aquolls (marsh), ponded, and similar soils**

*Extent:* 65 to 95 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Various textures
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Alluvium
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface

### *Additional Components*

Harps soils: 5 to 15 percent of the unit
Klossner soils: 0 to 10 percent of the unit
Okoboji soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Wildlife habitat

## 375—Fostoria clay loam, lacustrine substratum, 1 to 3 percent slopes

### *Component Description*

**Fostoria, lacustrine substratum, and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy sediments over lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 5.2 percent

### *Additional Components*

Belmann soils: 5 to 10 percent of the unit
Dickman soils: 5 to 10 percent of the unit
Dickinson, lacustrine substratum: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 376F—Cornell silty clay loam, 18 to 25 percent slopes

### *Component Description*

**Cornell and similar soils**

*Extent:* 60 to 85 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 18 to 25 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy and silty sediments overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.2 inches
*Content of organic matter in the upper 10 inches:* 2.3 percent

### *Additional Components*

Moneta soils: 5 to 15 percent of the unit
Everly, moderately eroded: 5 to 10 percent of the unit
Terril soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Hayland and pasture

## 379—Ocheyedan clay loam, lacustrine substratum, 0 to 2 percent slopes

### *Component Description*

**Ocheyedan, lacustrine substratum, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Flats in relict glacial lakes
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam

*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### Additional Components

Dickinson, lacustrine substratum: 5 to 10 percent of the unit
Fostoria, lacustrine substratum: 5 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 379B—Ocheyedan clay loam, lacustrine substratum, 2 to 5 percent slopes

### Component Description

**Ocheyedan, lacustrine substratum, and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### Additional Components

Dickinson, lacustrine substratum: 5 to 10 percent of the unit
Fostoria, lacustrine substratum: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 379C2—Ocheyedan clay loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded

### Component Description

**Ocheyedan, lacustrine substratum, moderately eroded, and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.1 inches
*Content of organic matter in the upper 10 inches:* 2.4 percent

### Additional Components

Dickinson, lacustrine substratum, moderately eroded: 5 to 15 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 384—Collinwood clay, 1 to 3 percent slopes

### Component Description

**Collinwood and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Clay
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Lacustrine sediments

*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 8.6 inches
*Content of organic matter in the upper 10 inches:* 5.4 percent

### *Additional Components*

Guckeen soils: 5 to 15 percent of the unit
Waldorf soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 390—Waldorf silty clay, 0 to 2 percent slopes

### *Component Description*

**Waldorf and similar soils**

*Extent:* 75 to 90 percent of the unit
*Geomorphic setting:* Flats in relict glacial lakes
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Lacustrine sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11.8 inches
*Content of organic matter in the upper 10 inches:* 6.8 percent

### *Additional Components*

Belmann soils: 5 to 15 percent of the unit
Collinwood soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 397—Letri clay loam, 0 to 2 percent slopes

### *Component Description*

**Letri and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 5.4 percent

### *Additional Components*

Wilmonton soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 433E—Moneta clay loam, 14 to 18 percent slopes

### *Component Description*

**Moneta and similar soils**

*Extent:* 60 to 90 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 14 to 18 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 10.3 inches
*Content of organic matter in the upper 10 inches:* 3.3 percent

### *Additional Components*

Everly, moderately eroded: 5 to 15 percent of the unit
Terril soils: 5 to 10 percent of the unit
Sac, moderately eroded: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Hayland and pasture

## 433F—Moneta clay loam, 18 to 25 percent slopes

### *Component Description*

**Moneta and similar soils**

*Extent:* 60 to 90 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 18 to 25 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 10.3 inches
*Content of organic matter in the upper 10 inches:* 3.3 percent

### *Additional Components*

Everly, moderately eroded: 5 to 15 percent of the unit
Terril soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Pasture

## 433G—Moneta clay loam, 25 to 40 percent slopes

### *Component Description*

**Moneta and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 25 to 40 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 10.3 inches
*Content of organic matter in the upper 10 inches:* 3.3 percent

### *Additional Components*

Terril soils: 5 to 15 percent of the unit
Everly, moderately eroded: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Pasture

## 455—Wilmonton clay loam, 1 to 3 percent slopes

### *Component Description*

**Wilmonton and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy pedisediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.2 inches
*Content of organic matter in the upper 10 inches:* 5.6 percent

### *Additional Components*

Everly soils: 5 to 10 percent of the unit
Letri soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 456—Wilmonton silty clay loam, 1 to 3 percent slopes

### *Component Description*

**Wilmonton and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Rises on uplands
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy pedisediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11 inches

*Content of organic matter in the upper 10 inches:* 5.2 percent

### Additional Components

Everly soils: 5 to 10 percent of the unit
Rushmore soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 485—Spillville loam, 0 to 2 percent slopes, occasionally flooded

### Component Description

**Spillville and similar soils**

*Extent:* 60 to 90 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy alluvium
*Frequency of flooding:* Occasional
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.8 inches
*Content of organic matter in the upper 10 inches:* 4.5 percent

### Additional Components

Coland soils: 5 to 15 percent of the unit
Hanlon soils: 0 to 15 percent of the unit
Havelock soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 506—Wacousta silty clay loam, depressional, 0 to 1 percent slopes

### Component Description

**Wacousta and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Depressions on ground moraines
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Silty lacustrine sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.7 inches
*Content of organic matter in the upper 10 inches:* 8.9 percent

### Additional Components

Calcousta soils: 5 to 10 percent of the unit
Harps soils: 0 to 10 percent of the unit
Klossner soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 507—Canisteo clay loam, 0 to 2 percent slopes

### Component Description

**Canisteo and similar soils**

*Extent:* 55 to 90 percent of the unit
*Geomorphic setting:* Flats on ground moraines
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Calcareous till or till-derived sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 10.9 inches
*Content of organic matter in the upper 10 inches:* 6.5 percent

### Additional Components

Webster soils: 5 to 15 percent of the unit
Crippin soils: 0 to 10 percent of the unit
Harps soils: 5 to 10 percent of the unit
Okoboji soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 541C—Estherville-Hawick complex, 5 to 9 percent slopes

### *Component Description*

**Estherville and similar soils**

*Extent:* 40 to 80 percent of the unit
*Geomorphic setting:* Ground moraines, outwash plains
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 4.1 inches
*Content of organic matter in the upper 10 inches:* 1.2 percent

**Hawick and similar soils**

*Extent:* 40 to 80 percent of the unit
*Geomorphic setting:* Ground moraines, outwash plains
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Gravelly loamy sand
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Parent material:* Sandy outwash sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.2 inches
*Content of organic matter in the upper 10 inches:* 1.9 percent

### *Additional Components*

Terril soils: 5 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 559—Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes

### *Component Description*

**Talcot and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces, outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 6.8 inches
*Content of organic matter in the upper 10 inches:* 6 percent

### *Additional Components*

Talcot soils that are 24 to 32 inches to sand and gravel: 5 to 15 percent of the unit
Biscay, depressional: 0 to 10 percent of the unit
Cylinder soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 577B—Everly clay loam, 2 to 5 percent slopes

### *Component Description*

**Everly and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Ridges on uplands
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 10.5 inches
*Content of organic matter in the upper 10 inches:* 3.4 percent

### *Additional Components*

Everly, moderately eroded: 5 to 15 percent of the unit
Wilmonton soils: 5 to 10 percent of the unit
Sac soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 577C2—Everly clay loam, 5 to 9 percent slopes, moderately eroded

### Component Description

**Everly, moderately eroded, and similar soils**

*Extent:* 60 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 10.4 inches
*Content of organic matter in the upper 10 inches:* 2.2 percent

### Additional Components

Everly soils that are only slightly eroded: 10 to 20 percent of the unit
Sac, moderately eroded: 0 to 10 percent of the unit
Terril soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 637D2—Everly-Moneta complex, 9 to 14 percent slopes, moderately eroded

### Component Description

**Everly, moderately eroded, and similar soils**

*Extent:* 30 to 55 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 9 to 14 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 10.4 inches
*Content of organic matter in the upper 10 inches:* 2.2 percent

**Moneta, moderately eroded, and similar soils**

*Extent:* 30 to 50 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 9 to 14 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 10.2 inches
*Content of organic matter in the upper 10 inches:* 2.9 percent

### Additional Components

Terril soils: 5 to 15 percent of the unit
Sac, moderately eroded: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 638C2—Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded

### Component Description

**Clarion, moderately eroded, and similar soils**

*Extent:* 48 to 58 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.8 inches
*Content of organic matter in the upper 10 inches:* 2.2 percent

**Storden, moderately eroded, and similar soils**

*Extent:* 30 to 39 percent of the unit

*Geomorphic setting:* Ground moraines
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 1.5 percent

### *Additional Components*

Clarion soils that are only slightly eroded: 0 to 10 percent of the unit
Sunburg, moderately eroded: 0 to 10 percent of the unit
Terril soils: 3 to 7 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 672—May City sandy clay loam, 0 to 2 percent slopes

### *Component Description*

**May City and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands; outwash plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Sandy clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly and loamy material
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.9 inches
*Content of organic matter in the upper 10 inches:* 2.4 percent

### *Additional Components*

Dickinson soils: 0 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 672B—May City sandy clay loam, 2 to 5 percent slopes

### *Component Description*

**May City and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Ridges on uplands; outwash plains
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Sandy clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly and loamy material
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.9 inches
*Content of organic matter in the upper 10 inches:* 2.4 percent

### *Additional Components*

Hawick soils: 0 to 12 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 672C2—May City sandy clay loam, 5 to 9 percent slopes, moderately eroded

### *Component Description*

**May City, moderately eroded, and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands; outwash plains
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Sandy clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Gravelly and loamy material
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.7 inches
*Content of organic matter in the upper 10 inches:* 2 percent

### Additional Components

Hawick soils: 5 to 12 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 709—Fairhaven silt loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes

### Component Description

**Fairhaven and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silt loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Silty sediments over sand and gravel
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 7.7 inches
*Content of organic matter in the upper 10 inches:* 4.3 percent

### Additional Components

Fairhaven soils that are 24 to 32 inches to sand and gravel: 10 to 12 percent of the unit
Cylinder soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 733—Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded

### Component Description

**Calco and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Calcareous silty alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.4 inches
*Content of organic matter in the upper 10 inches:* 5.9 percent

### Additional Components

Colo soils: 5 to 15 percent of the unit
Spillville soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 735—Havelock clay loam, 0 to 2 percent slopes, occasionally flooded

### Component Description

**Havelock and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy calcareous alluvium
*Frequency of flooding:* Occasional
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11.4 inches
*Content of organic matter in the upper 10 inches:* 5.7 percent

### Additional Components

Coland soils: 5 to 15 percent of the unit
Spillville soils: 5 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 740D—Hawick gravelly loamy sand, 9 to 14 percent slopes

### Component Description

**Hawick and similar soils**

*Extent:* 60 to 100 percent of the unit

*Geomorphic setting:* Ground moraines, outwash plains
*Position on the landform:* Backslopes, risers
*Slope range:* 9 to 14 percent
*Texture of the surface layer:* Gravelly loamy sand
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Parent material:* Sandy outwash sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.2 inches
*Content of organic matter in the upper 10 inches:* 1.9 percent

### *Additional Components*

Estherville soils: 5 to 15 percent of the unit
Dickman soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 810—Galva silty clay loam, terrace, 0 to 2 percent slopes

### *Component Description*

**Galva, terrace, and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Treads on stream terraces
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loess overlying sand and gravel outwash
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 12.2 inches
*Content of organic matter in the upper 10 inches:* 4.1 percent

### *Additional Components*

Primghar soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 810B—Galva silty clay loam, terrace, 2 to 5 percent slopes

### *Component Description*

**Galva, terrace, and similar soils**

*Extent:* 100 percent of the unit
*Geomorphic setting:* Risers on stream terraces
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loess overlying sand and gravel outwash
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 12.2 inches
*Content of organic matter in the upper 10 inches:* 3.5 percent

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 828B—Zenor sandy loam, 2 to 5 percent slopes

### *Component Description*

**Zenor and similar soils**

*Extent:* 80 to 95 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Glacial outwash
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.9 inches
*Content of organic matter in the upper 10 inches:* 1.7 percent

### *Additional Components*

Sunburg soils: 5 to 10 percent of the unit
Clarion soils: 0 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 828C2—Zenor sandy loam, 5 to 9 percent slopes, moderately eroded

### Component Description

**Zenor, moderately eroded, and similar soils**

*Extent:* 70 to 85 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Parent material:* Glacial outwash
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 3.7 inches
*Content of organic matter in the upper 10 inches:* 1.3 percent

### Additional Components

Clarion, moderately eroded: 5 to 10 percent of the unit
Sunburg soils: 5 to 10 percent of the unit
Terril soils: 5 to 10 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 835D2—Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded

### Component Description

**Storden, moderately eroded, and similar soils**

*Extent:* 44 to 52 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 9 to 14 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 11 inches
*Content of organic matter in the upper 10 inches:* 1.5 percent

**Omsrud, moderately eroded, and similar soils**

*Extent:* 29 to 40 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 9 to 14 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 11.5 inches
*Content of organic matter in the upper 10 inches:* 2.2 percent

### Additional Components

Sunburg soils: 0 to 15 percent of the unit
Terril soils: 3 to 7 percent of the unit

### Management Considerations

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 835E2—Storden-Omsrud complex, 14 to 18 percent slopes, moderately eroded

### Component Description

**Storden, moderately eroded, and similar soils**

*Extent:* 40 to 60 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 14 to 18 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 10.9 inches
*Content of organic matter in the upper 10 inches:* 1.6 percent

**Omsrud, moderately eroded, and similar soils**

*Extent:* 30 to 50 percent of the unit
*Geomorphic setting:* Ground moraines
*Slope range:* 14 to 18 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Calcareous till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 11.5 inches
*Content of organic matter in the upper 10 inches:* 2.2 percent

### *Additional Components*

Storden soils that are only slightly eroded: 0 to 7 percent of the unit
Terril soils: 0 to 5 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 854D—Histosols, fens, 2 to 25 percent slopes

### *Component Description*

**Histosols and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Position on the landform:* Backslopes
*Slope range:* 2 to 25 percent
*Texture of the surface layer:* Various textures
*Depth to restrictive feature:* More than 60 inches
*Drainage class:* Poorly drained
*Parent material:* Organic material over till
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface

### *Additional Components*

Coland soils: 0 to 10 percent of the unit
Klossner soils: 0 to 20 percent of the unit
Storden, moderately eroded: 0 to 10 percent of the unit
Terril soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Wildlife habitat

## 874—Dickinson sandy loam, lacustrine substratum, 0 to 2 percent slopes

### *Component Description*

**Dickinson, lacustrine substratum, and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Flats in relict glacial lakes
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Eolian sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.4 inches
*Content of organic matter in the upper 10 inches:* 2.5 percent

### *Additional Components*

Ocheyedan, lacustrine substratum: 5 to 12 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 874B—Dickinson sandy loam, lacustrine substratum, 2 to 5 percent slopes

### *Component Description*

**Dickinson, lacustrine substratum, and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Eolian sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.4 inches
*Content of organic matter in the upper 10 inches:* 2.5 percent

### *Additional Components*

Ocheyedan, lacustrine substratum: 5 to 12 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 874C2—Dickinson sandy loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded

### *Component Description*

**Dickinson, lacustrine substratum, moderately eroded, and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Rises in relict glacial lakes
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Eolian sediments overlying lacustrine sediments
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Available water capacity to a depth of 60 inches:* 5.4 inches
*Content of organic matter in the upper 10 inches:* 1.3 percent

### *Additional Components*

Ocheyedan, lacustrine substratum, moderately eroded: 5 to 12 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 875—Roine fine sandy loam, 0 to 2 percent slopes

### *Component Description*

**Roine and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Fine sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Eolian sediments overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 9.1 inches
*Content of organic matter in the upper 10 inches:* 2.3 percent

### *Additional Components*

Dickinson soils: 5 to 10 percent of the unit
Ocheyedan soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 875B—Roine fine sandy loam, 2 to 5 percent slopes

### *Component Description*

**Roine and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Ridges on uplands
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Fine sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Eolian sediments overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 9.1 inches
*Content of organic matter in the upper 10 inches:* 2.3 percent

### *Additional Components*

Ocheyedan soils: 5 to 12 percent of the unit
Dickinson soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 875C2—Roine fine sandy loam, 5 to 9 percent slopes, moderately eroded

### *Component Description*

**Roine, moderately eroded, and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands
*Slope range:* 5 to 9 percent
*Texture of the surface layer:* Fine sandy loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Eolian sediments overlying till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 9.2 inches
*Content of organic matter in the upper 10 inches:* 2.3 percent

### *Additional Components*

Dickinson soils: 5 to 15 percent of the unit
Ocheyedan soils: 0 to 7 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 878—Ocheyedan loam, 0 to 2 percent slopes

### *Component Description*

**Ocheyedan and similar soils**

*Extent:* 75 to 90 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.5 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### *Additional Components*

Everly soils: 5 to 10 percent of the unit
Fostoria soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 878B—Ocheyedan loam, 2 to 5 percent slopes

### *Component Description*

**Ocheyedan and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Ridges on uplands
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.5 inches
*Content of organic matter in the upper 10 inches:* 3.2 percent

### *Additional Components*

Everly soils: 5 to 10 percent of the unit
Fostoria soils: 0 to 10 percent of the unit
Ocheyedan, moderately eroded: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 879—Fostoria loam, 1 to 3 percent slopes

### *Component Description*

**Fostoria and similar soils**

*Extent:* 75 to 90 percent of the unit
*Geomorphic setting:* Ridges on uplands
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 12.6 inches
*Content of organic matter in the upper 10 inches:* 5.2 percent

### *Additional Components*

Everly soils: 5 to 10 percent of the unit
Ocheyedan soils: 5 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 928—Annieville silty clay loam, 0 to 2 percent slopes

### *Component Description*

**Annieville and similar soils**

*Extent:* 70 to 90 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Parent material:* Loess over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.9 inches
*Content of organic matter in the upper 10 inches:* 3.9 percent

### *Additional Components*

Galva soils: 5 to 15 percent of the unit
McCreath soils: 0 to 10 percent of the unit
Sac soils: 0 to 15 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 928B—Annieville silty clay loam, 2 to 5 percent slopes

### *Component Description*

**Annieville and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Hillslopes on uplands; ridges on uplands
*Slope range:* 2 to 5 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* More than 60 inches
*Drainage class:* Moderately well drained
*Parent material:* Loess over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 4 to 6 feet
*Available water capacity to a depth of 60 inches:* 11.9 inches
*Content of organic matter in the upper 10 inches:* 3.5 percent

### *Additional Components*

Galva soils: 5 to 10 percent of the unit
Sac soils: 5 to 15 percent of the unit
McCreath soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 992—Gillett Grove silty clay loam, depressional, 0 to 1 percent slopes

### *Component Description*

**Gillett Grove and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Depressions on uplands
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* More than 60 inches
*Drainage class:* Poorly drained
*Parent material:* Loess overlying till
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.1 inches

*Content of organic matter in the upper 10 inches:* 6.2 percent

### *Additional Components*

Gillett Grove soils that are not in depressions: 10 to 20 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1053—Belmann clay loam, gypsum phase, 0 to 2 percent slopes

### *Component Description*

**Belmann, gypsum phase, and similar soils**

*Extent:* 65 to 90 percent of the unit
*Geomorphic setting:* Flats in relict glacial lakes; swales in relict glacial lakes
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy sediments overlying lacustrine sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 10.7 inches
*Content of organic matter in the upper 10 inches:* 4.4 percent

### *Additional Components*

Belmann soils that do not have gypsum: 5 to 10 percent of the unit
Okoboji soils: 5 to 10 percent of the unit
Fostoria, lacustrine substratum: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Tall grass prairie; prairie
*Major uses:* Cropland, hayland, and pasture

## 1091—McCreath silty clay loam, 0 to 2 percent slopes

### *Component Description*

**McCreath and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loess over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.7 inches
*Content of organic matter in the upper 10 inches:* 5.1 percent

### *Additional Components*

Ransom soils: 5 to 15 percent of the unit
Gillett Grove soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1092—Gillett Grove silty clay loam, 0 to 2 percent slopes

### *Component Description*

**Gillett Grove and similar soils**

*Extent:* 75 to 95 percent of the unit
*Geomorphic setting:* Flats on uplands
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loess overlying till
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.1 inches
*Content of organic matter in the upper 10 inches:* 6.2 percent

### *Additional Components*

McCreath soils: 5 to 15 percent of the unit
Afton soils: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1133—Colo silty clay loam, channeled, 0 to 2 percent slopes, frequently flooded

### *Component Description*

**Colo and similar soils**

*Extent:* 65 to 85 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* More than 60 inches
*Drainage class:* Poorly drained
*Parent material:* Silty alluvium
*Frequency of flooding:* Frequent
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 12.4 inches
*Content of organic matter in the upper 10 inches:* 5.8 percent

### *Additional Components*

Colo soils that are not channeled: 0 to 20 percent of the unit
Coland soils: 0 to 10 percent of the unit
Water: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Wildlife habitat, pasture

## 1259—Biscay clay loam, 32 to 40 inches to sand and gravel, depressional, 0 to 1 percent slopes

### *Component Description*

**Biscay, depressional, and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Depressions on stream terraces
*Slope range:* 0 to 1 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Parent material:* Loamy sediments over sand and gravel
*Flooding:* None
*Seasonal high water table (in undrained areas):* 1 foot above to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 8.5 inches
*Content of organic matter in the upper 10 inches:* 6.9 percent

### *Additional Components*

Shandep soils: 5 to 15 percent of the unit
Talcot soils: 5 to 10 percent of the unit
Biscay soils that are 24 to 32 inches to sand and gravel: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1385—Ocheda silty clay loam, 1 to 3 percent slopes

### *Component Description*

**Ocheda and similar soils**

*Extent:* 85 percent of the unit
*Geomorphic setting:* Rises on ground moraines
*Slope range:* 1 to 3 percent
*Texture of the surface layer:* Silty clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Lacustrine sediments over till
*Flooding:* None
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 8.5 inches
*Content of organic matter in the upper 10 inches:* 5 percent

### *Additional Components*

Collinwood soils: 0 to 10 percent of the unit
Guckeen soils: 0 to 10 percent of the unit
Nicollet soils: 0 to 10 percent of the unit
Clarion soils: 0 to 5 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1508—Belmann clay loam, 0 to 2 percent slopes

### *Component Description*

**Belmann and similar soils**

*Extent:* 70 to 95 percent of the unit
*Geomorphic setting:* Flats in relict glacial lakes
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam

*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy sediments overlying lacustrine sediments
*Flooding:* None
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 9.7 inches
*Content of organic matter in the upper 10 inches:* 5 percent

### *Additional Components*

Ocheyedan, lacustrine substratum: 5 to 15 percent of the unit
Belmann, gypsum phase: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Cropland, hayland, and pasture

## 1585—Spillville-Coland complex, channeled, 0 to 2 percent slopes, frequently flooded

### *Component Description*

**Spillville and similar soils**

*Extent:* 35 to 50 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Parent material:* Loamy alluvium
*Frequency of flooding:* Frequent
*Depth to seasonal high water table (in undrained areas):* 1.0 to 3.5 feet
*Available water capacity to a depth of 60 inches:* 11.6 inches
*Content of organic matter in the upper 10 inches:* 4 percent

**Coland and similar soils**

*Extent:* 30 to 40 percent of the unit
*Geomorphic setting:* Flood plains
*Slope range:* 0 to 2 percent
*Texture of the surface layer:* Clay loam
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Parent material:* Loamy alluvium
*Frequency of flooding:* Frequent
*Seasonal high water table (in undrained areas):* At the surface to 1 foot below the surface
*Available water capacity to a depth of 60 inches:* 11.3 inches
*Content of organic matter in the upper 10 inches:* 6 percent

### *Additional Components*

Hanlon soils: 5 to 15 percent of the unit
Havelock soils: 0 to 10 percent of the unit
Water: 0 to 10 percent of the unit

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Pasture, wildlife habitat

## 4000—Urban land

• This map unit consists of areas that are covered by buildings, roads, streets, parking lots, mobile home parks, and other structures. The original soils can no longer be identified.

## 5010—Pits, sand and gravel

### *Component Description*

**Pits, sand and gravel**

*Definition:* This map unit consists of areas from which sand and gravel have been removed.
*Extent:* 100 percent of the unit
*Geomorphic setting:* Stream terraces
*Slope range:* 0 to 4 percent
*Depth to restrictive feature:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Parent material:* Loamy alluvium over sand and gravel

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Source of sand and gravel; wildlife habitat

## 5040—Udorthents, loamy (cut and fill land)

### *Component Description*

**Udorthents, loamy**

*Extent:* 100 percent of the unit
*Slope range:* 0 to 8 percent
*Depth to restrictive feature:* Very deep (more than 60 inches)

*Depth to seasonal high water table (in undrained areas):* More than 6 feet
*Drainage class:* Well drained

### *Management Considerations*

*Native plant cover:* Prairie
*Major uses:* Fill material, wildlife habitat

## 5060—Pits, clay

### *Component Description*

**Pits, clay**

*Definition:* This map unit consists of areas from which clay has been removed for use as drainage tile.
*Extent:* 100 percent of the unit
*Depth to restrictive feature:* Very deep (more than 60 inches)

### *Management Considerations*

*Major uses:* Wildlife habitat

## AW—Animal waste

- This map unit consists of shallow ponds constructed to hold animal waste from farm feedlots.

## SL—Sewage lagoon

- This map unit consists of shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid waste.

## W—Water

- This map unit consists of natural bodies of water.

# Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand, gravel, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

### Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

### Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Cropland Management Considerations

The management concerns affecting the use of the detailed soil map units for crops are shown in table 5. The main concerns in managing nonirrigated cropland are conserving moisture, controlling wind erosion and water erosion, and maintaining soil fertility.

*Conserving moisture* consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *wind erosion* and *water erosion.* Conservation tillage, stripcropping, field windbreaks, contour farming, conservation cropping systems, crop residue management, terraces, diversions, and grassed waterways (fig. 7) help to prevent excessive soil loss.

Measures that are effective in *maintaining soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the considerations shown in the table cannot be easily overcome. These are *channels, flooding, gullies,* and *ponding.*

Additional considerations include the following:

*Lime content, limited available water capacity, potential poor tilth and compaction,* and *restricted permeability.*—These limitations can be minimized by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer in areas of soils that have a high content of lime.

*Potential for ground-water contamination.*—The proper use of nutrients and pesticides can reduce the risk of ground-water contamination.

*Potential for surface-water contamination.*—The risk of surface-water contamination can be reduced by the proper use of nutrients and pesticides and by conservation farming practices that reduce the runoff rate.

*Surface crusting.*—This limitation retards seedling development after periods of heavy rainfall.

*Surface rock fragments.*—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

*Surface stones.*—Stones or boulders on or near the surface can hinder normal tillage unless they are removed.

*Salt content.*—In areas where this is a limitation, only salt-tolerant crops should be grown.

On irrigated soils the main management concerns are efficient water use, nutrient management, control of erosion, pest and weed control, and timely planting and harvesting for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can increase wetness and soil salinity.

### Explanation of Criteria

*Acid soil.*—The pH is less than 6.1.

*Channeled.*—The word “channeled” is included in the map unit name.

*Dense layer.*—The bulk density is 1.80 g/cc or greater within the soil profile.

*Depth to rock.*—The depth to bedrock is less than 40 inches.

*Eroded.*—The word “eroded” is included in the map unit name.

*Excessive permeability.*—Saturated hydraulic conductivity is 42 micrometers per second or more within the soil profile.

*Flooding.*—Flooding is occasional, frequent, or very frequent.

*Gullied.*—The word “gullied” is included in the map unit name.

*High content of organic matter.*—The surface layer has more than 20 percent organic matter.

*Lime content.*—The pH is 7.4 or more in the surface layer, or the wind erodibility group is 4L.

*Limited available water capacity.*—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

*Limited content of organic matter.*—The content of organic matter is 2 percent or less in the surface layer.

*Ponding.*—Ponding duration is assigned to the map unit component. Water is above the surface.

*Potential poor tilth and compaction.*—The content of clay is 27 percent or more in the surface layer.

*Potential for ground-water contamination* (by nutrients or pesticides).—The depth to a seasonal high water table is 4 feet or less, the saturated hydraulic conductivity of any layer is more than 42 micrometers per second, or the depth to bedrock is less than 60 inches.

**Figure 7.—Grassed waterways, contour farming, and other conservation practices help to control erosion in many areas of Clay County, particularly in areas of MLRA 107.**

*Potential for surface-water contamination* (by nutrients or pesticides).—The map unit component is occasionally, frequently, or very frequently flooded, is subject to ponding, is assigned to hydrologic group C or D and has a slope of more than 2 percent, is assigned to hydrologic group A and has a slope of more than 6 percent, or is assigned to hydrologic group B, has a slope of 3 percent or more, and has a K factor of more than 0.17.

*Restricted permeability.*—Saturated hydraulic conductivity is less than 0.42 micrometer per second within the soil profile.

*Salt content.*—The electrical conductivity is 4 or more in the surface layer or 8 or more within a depth of 30 inches.

*Seasonal high water table.*—The water table is within 2.5 feet of the surface.

*Slope* (equipment limitation).—The slope is more than 15 percent.

*Surface crusting.*—The content of clay in the surface layer is 27 percent or more, and the content of organic matter is 2 percent or less.

*Surface rock fragments* (equipment limitation).—The terms describing the texture of the surface layer include any rock fragment modifier, except for gravelly, channery, stony, very stony, extremely stony, bouldery, very bouldery, and extremely bouldery.

*Surface stones* (equipment limitation).—The word “stony” or “bouldery” is included in the description of the surface layer, or at least 0.01 percent of the surface is covered with boulders.

*Water erosion.*—Either the slope is 6 percent or more, or the slope is more than 3 percent and less than 6 percent and the surface layer is not sandy.

*Wind erosion.*—The wind erodibility group is 1, 2, 3, or 4L.

Hydrologic groups are described under the heading “Water Features.” Erosion factors (e.g., K factor) and wind erodibility groups are described under the heading “Physical Properties.”

## Crop Yield Estimates

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each soil also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Table 6 also shows the corn suitability rating (CSR) for the soils in the survey area. Corn suitability ratings provide a relative ranking of all soils mapped in the State of Iowa based on their potential to be utilized for the intensive production of row crops. The CSR is an index that can be used to rate the potential production of one soil compared with another over a period of time. The CSR considers average weather conditions and frequency of use of the soil for row crops. Ratings range from 100 for soils that have no physical limitations, are on minimal slopes, and can be continuously row cropped to as low as 5 for soils that have severe limitations affecting the production of row crops. The ratings listed in this table assume adequate management, natural weather conditions (no irrigation), artificial drainage where required, and no land leveling or terracing. They also assume that soils in the lower positions on the landscape are not affected by frequent damaging floods. The weighted CSR for a given field can be modified by the occurrence of sandy spots, local deposits, rock and gravel outcrops, field boundaries, and noncrossable drainageways. Even though predicted average yields will change with time, the CSRs are expected to remain relatively constant in relation to one another.

The CSRs in Clay County range from 83 (for map unit 1091) to 5 (for map unit 41C, for example). No ratings are provided for miscellaneous areas because of the variability of properties and use of these areas.

Inherent subsoil fertility levels, in terms of potential plant-available phosphorus and potassium, also are given in table 6. Soil tests of the tilled layer are used to determine the most profitable rates of fertilizers for various crops. Nutrient levels in the subsurface layers influence crop yields, particularly in the drier seasons when the nutrients in the dry tilled layer become temporarily unavailable to plants. The availability of nutrients in the tilled layer and the subsoil influences the relative uptake from the two zones in the soil profile. Fertilizer recommendations based on soil tests of the tilled layer may be adjusted by the average nutrient levels in the subsoil of each soil series. Fertilizer recommendations are adjusted for subsoil nutrient levels. The ratings given in the table are described as follows:

*Subsoil phosphorus.*—The amount of plant-available phosphorus in the subsoil expressed in parts per million and based on the weighted average of air-dried soil samples from the subsoil (at a depth of 30 to 42 inches). (The value listed for complexes is the most limiting value of the soils identified in the map unit name.) A rating of very low indicates less than 7.5 ppm; low, 7.5 to 13.0 ppm; medium, 13.0 to 22.5 ppm; and high, more than 22.5 ppm.

*Subsoil potassium.*—The amount of plant-available potassium in the subsoil expressed in parts per million and based on the weighted average of air-dried soil samples from the subsoil (at a depth of 12 to 24 inches). (The value listed for complexes is the most limiting value of the soils identified in the map unit name.) A rating of very low indicates less than 50 ppm; low, 50 to 79 ppm; medium, 79 to 125 ppm; and high, more than 125 ppm.

## Pasture and Hayland Interpretations

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing

helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

The average yields per acre that can be expected of the principal pasture and hay crops under a high level of management are shown in table 7. Yield estimates are often provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in the table.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit (USDA, 1961). These categories indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7.

Areas in class 8 are generally not suitable for crops, pasture, or woodland without a level of management that is impractical. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

*Capability subclasses* identify the dominant kind of limitation in the class. They are designated by adding a small letter, *e, w, s,* or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness has been partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, woodland, wildlife habitat, or recreation.

The capability classification of the soils in the survey area is given in tables 6 and 7.

## Prime Farmland

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a

sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range mainly from 0 to 6 percent.

Soils that have a high water table or are subject to flooding may qualify as prime farmland where these limitations are overcome by drainage measures or flood control. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 310,870 acres, or nearly 85 percent of the survey area, meets the requirements for prime farmland.

The map units in the survey area that meet the requirements for prime farmland are listed in table 8. This list does not constitute a recommendation for a particular land use. On some soils included in the table, measures that overcome limitations are needed. The need for these measures is indicated in parentheses after the map unit name. The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section “Detailed Soil Map Units.”

## Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

## Woodland Management and Productivity

Table 10 can help woodland owners or forest managers plan the use of soils for wood crops. Only those soils suitable for wood crops are listed.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number,

expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

*Trees to manage* are those that are suitable for commercial wood production.

## Recreation

The soils of the survey area are rated in tables 11a and 11b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 11a and 11b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Playgrounds* require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that

affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Off-road motorcycle trails* require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

## Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, soybeans, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are bromegrass, timothy, orchardgrass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, bluegrass, dandelions, goldenrod, ragweed, wheatgrass, and nightshade.

*Hardwood trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, box elder, birch, maple, green ash, willow, and American elm.

Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

*Coniferous plants* furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include Hungarian partridge, ring-necked pheasant, bobwhite quail, sharp-tailed grouse, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, owls, tree squirrels, gray fox, raccoon, and deer.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

## Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 13a and 13b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a

cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

## Sanitary Facilities

Tables 14a and 14b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated

trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

## Construction Materials

Table 15 gives information about the soils as potential sources of gravel, sand, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated as *possible, probable,* or *improbable* sources of gravel and are rated *good, fair,* or *poor* as potential sources of sand. In this table, gravel is defined as particles ranging from 0.2 inch to 3.0 inches in diameter. Soils rated as a *possible* source of gravel contain at least 25 percent gravel, by weight. Soils rated as a *probable* source contain at least 50 percent gravel, by weight. For sand, a rating of *good* or *fair* means that the source material is likely to be in or below the soil. For both sand and gravel, the bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil. The features that limit the soils as sources of this material are specified in the table. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil. The lower the number, the greater the limitation.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

# Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

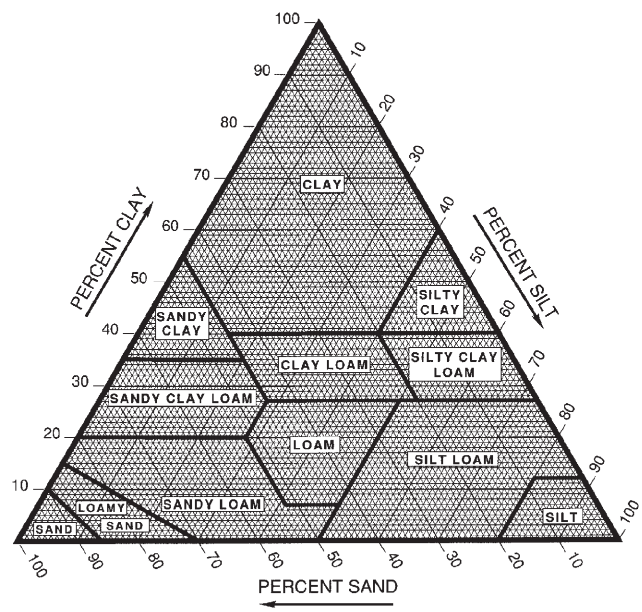


**Figure 8.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.**

## Engineering Index Properties

Table 17 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 8). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

*Classification* of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and

plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

## Physical Properties

Table 18 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 18, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$- or $^{1}/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Permeability* refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity ($K_{sat}$). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod

at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in table 18 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. Descriptions of these groups are available in the National Soil Survey Handbook (USDA, 2003).

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

## Chemical Properties

Table 19 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Soil reaction* is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Calcium carbonate* equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

*Gypsum* is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

## Water Features

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. Table 20 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 20 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less

specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

## Soil Features

Table 21 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udoll (*Ud*, meaning humid, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludolls (*Hapl*, meaning minimal horizonation, plus *udoll*, the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, superactive, mesic Typic Hapludolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

### *Afton Series*

#### *Typical Pedon*

Afton silty clay loam, 0 to 2 percent slopes, in a cultivated field; 500 feet north and 75 feet east of the southwest corner of sec. 24, T. 96 N., R. 38 W., Lone Tree Township; USGS Royal, Iowa, topographic quadrangle; lat. 43 degrees 06 minutes 50 seconds N. and long. 95 degrees 17 minutes 20 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; moderate fine granular structure; friable; slightly acid; abrupt wavy boundary.

A1—7 to 16 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; slightly acid; gradual smooth boundary.

A2—16 to 25 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; slightly acid; gradual smooth boundary.

A3—25 to 32 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; neutral; clear smooth boundary.

Bg1—32 to 37 inches; dark gray (5Y 4/1) silty clay loam; moderate fine subangular blocky structure; friable; common very dark gray (10YR 3/1) organic coatings on faces of peds; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; neutral; clear smooth boundary.

Bg2—37 to 43 inches; dark gray (5Y 4/1) silty clay loam; moderate fine subangular blocky structure; friable; many fine dark manganese concretions; common fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; abrupt wavy boundary.

2Cg1—43 to 54 inches; gray (5Y 5/1) clay loam; massive; friable; many fine dark manganese concretions; common or many medium distinct strong brown (7.5YR 5/6), few fine distinct strong brown (7.5YR 5/8), and few fine and medium prominent yellowish red (5YR 4/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Cg2—54 to 65 inches; gray (5Y 5/1) loam that has thin strata of sandy loam and silty clay loam; massive; friable; thin strata (2 inches thick) of strong brown (7.5YR 5/8) medium and coarse sand at a depth of 63 to 65 inches; few medium distinct strong brown (7.5YR 5/6) redoximorphic concentrations; slightly effervescent; moderately alkaline; abrupt wavy boundary.

3Cg3—65 to 72 inches; olive gray (5Y 5/2) loam; massive; friable; few fine dark manganese concretions; about 3 percent gravel; about 2 percent fine fragments of shale; few medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly effervescent; moderately alkaline; abrupt wavy boundary.

3Cg4—72 to 80 inches; olive gray (5Y 5/2) loam; massive; firm; about 3 percent gravel; about 2 percent fine fragments of shale; many fine and medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 36 to 55 inches
*Depth to till:* More than 40 inches
*Thickness of the mollic epipedon:* 24 to 32 inches

*A horizon:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—neutral to moderately alkaline

*2Cg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—loam or clay loam; stratified sediments overlie the till in some pedons
Reaction—slightly alkaline or moderately alkaline

*3Cg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—2
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Annieville Series

### Typical Pedon

Annieville silty clay loam, 0 to 2 percent slopes, in a cultivated field; 135 feet south and 1,290 feet east of the northwest corner of sec. 35, T. 94 N., R. 38 W., Peterson Township; USGS Peterson, Iowa, topographic quadrangle; lat. 42 degrees 55 minutes 28 seconds N. and long. 95 degrees 18 minutes 17 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to moderate

fine granular; friable; slightly acid; abrupt wavy boundary.

A—8 to 15 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; slightly acid; clear smooth boundary.

AB—15 to 20 inches; dark brown (10YR 3/3) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

Bw1—20 to 31 inches; brown (10YR 4/3) silty clay loam; weak medium and fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

Bw2—31 to 38 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bw3—38 to 52 inches; olive brown (2.5Y 4/3) silt loam; weak fine subangular blocky structure; friable; many very fine dark manganese concentrations; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; slightly acid; abrupt wavy boundary.

2C1—52 to 57 inches; yellowish brown (10YR 5/4) sandy loam; single grain; loose; stone line with small pebbles at a depth of 52 to 54 inches; about 5 percent gravel; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2C2—57 to 69 inches; mottled yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2) clay loam; massive; firm; about 3 percent gravel; many fine dark manganese concentrations; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

2C3—69 to 80 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; many fine dark manganese concentrations; grayish brown (2.5Y 5/2) linings of root channels; about 3 percent gravel; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 40 to 60 inches
*Thickness of the mollic epipedon:* 10 to 20 inches
*Depth to till:* 40 to 60 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Reaction—slightly acid or neutral

*AB horizon:*
Hue—10YR
Value—2 to 4
Chroma—1 to 3
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

*Bw horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

*2C horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—sandy loam, loam, or clay loam
Reaction—slightly alkaline or moderately alkaline

## Belmann Series

### Typical Pedon

Belmann clay loam, 0 to 2 percent slopes, in a cultivated field; 93 feet west and 700 feet south of the northeast corner of sec. 5, T. 96 N., R. 36 W., Sioux Township; USGS Dickens, Iowa, topographic quadrangle; 43 degrees 10 minutes 04 seconds N. and long. 95 degrees 06 minutes 45 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine roots; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A—8 to 16 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak medium granular structure; firm; common very fine roots; slightly effervescent; slightly alkaline; clear wavy boundary.

Bg1—16 to 24 inches; olive gray (5Y 4/2) clay loam; weak very fine subangular blocky structure; firm; common very fine roots; common distinct very dark gray (5Y 3/1) organic coatings on faces of peds; common fine prominent light olive brown (2.5Y 5/6) and common fine faint olive (5Y 5/3) redoximorphic concentrations; strongly

effervescent; slightly alkaline; gradual smooth boundary.

2Bg2—24 to 32 inches; olive gray (5Y 5/2) silty clay; moderate very fine and fine subangular blocky structure; firm; common very fine roots; common distinct olive gray (5Y 4/2) organic coatings on faces of peds; common fine prominent irregular light olive brown (2.5Y 5/4 and 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

2Bkg1—32 to 42 inches; olive gray (5Y 5/2) silty clay; moderate very fine and fine subangular blocky structure; firm; common very fine roots; few distinct dark gray (5Y 4/1) organic coatings on faces of peds; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; common fine prominent yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6) irregular redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

2Bkg2—42 to 52 inches; olive gray (5Y 5/2) silty clay; moderate very fine and fine subangular blocky structure; friable; few very fine roots; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; many fine prominent yellowish brown (10YR 5/6) irregular redoximorphic concentrations; strongly effervescent; slightly alkaline; clear smooth boundary.

2BCg—52 to 61 inches; olive gray (5Y 5/2) silty clay loam; weak very fine prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; clear smooth boundary.

2Cg—61 to 80 inches; olive gray (5Y 5/2) silty clay; massive; friable; common medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 0 to 10 inches
*Depth to fine textured sediments:* 20 to 40 inches
*Thickness of the mollic epipedon:* 10 to 24 inches

*A or Ap horizon:*
Hue—10YR, 2.5Y, or N
Value—2
Chroma—0 or 1
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—clay loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

*2Bg or 2Bkg horizon:*
Hue—5Y or 2.5Y
Value—4 or 5
Chroma—1 to 3
Texture—silty clay loam, silty clay, or clay
Reaction—slightly alkaline or moderately alkaline

*2BCg or 2Cg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—2 or 3
Texture—silt loam, silty clay loam, silty clay, or clay
Reaction—slightly alkaline or moderately alkaline

## Biscay Series

### Typical Pedon

Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes, in a cultivated field; 680 feet east and 160 feet north of the southwest corner of sec. 2, T. 96 N., R. 38 W., Lone Tree Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 09 minutes 23 seconds N. and long. 95 degrees 18 minutes 22 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; friable; neutral; abrupt smooth boundary.

A—7 to 17 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; slightly acid; gradual smooth boundary.

AB—17 to 23 inches; black (N 2/0) clay loam with some mixing of olive gray (5Y 4/2) clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bg1—23 to 27 inches; olive gray (5Y 5/2) and dark gray (5Y 4/1) clay loam; moderate fine and medium subangular blocky structure; friable; common black (5Y 2.5/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg2—27 to 35 inches; olive gray (5Y 5/2) clay loam;

weak fine and medium subangular blocky structure; friable; few fine white (10YR 8/1) and very pale brown (10YR 8/3) calcium carbonate nodules; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Bg3—35 to 39 inches; olive gray (5Y 5/2) sandy clay loam; very weak fine and medium subangular blocky structure; very friable; common white (10YR 8/1) calcium carbonate coatings on gravel; about 10 percent gravel; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Cg1—39 to 48 inches; grayish brown (2.5Y 5/2) loamy sand; single grain; loose; common white (10YR 8/1) calcium carbonate coatings on gravel; about 8 percent gravel; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Cg2—48 to 68 inches; grayish brown (2.5Y 5/2) medium and coarse sand; single grain; loose; about 10 percent gravel (few pebbles are 1 to 3 inches in diameter); strongly effervescent; slightly alkaline; abrupt wavy boundary.

2Cg3—68 to 80 inches; grayish brown (2.5Y 5/2) sand; single grain; loose; about 10 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 24 inches
*Depth to contrasting material:* 20 to 40 inches
*Depth to carbonates:* 20 to 40 inches

*Ap and A horizons:*
Hue—10YR, 2.5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—clay loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—5Y, 5GY, or 2.5Y
Value—4 or 5
Chroma—1 to 3
Texture—loam, sandy clay loam, or clay loam
Reaction—neutral or slightly alkaline

*2BCg horizon (if it occurs):*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 to 4
Texture—gravelly loam or gravelly sandy loam
Reaction—slightly acid to slightly alkaline

*2Cg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—loamy sand, sand, coarse sand, or loamy coarse sand or the gravelly or very gravelly analogs of these textures
Reaction—slightly alkaline or moderately alkaline

## Calco Series

### Typical Pedon

Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field; 650 feet east and 700 feet south of the northwest corner of sec. 16, T. 95 N., R. 35 W., Logan Township; USGS Silver Lake, Iowa, topographic quadrangle; lat. 43 degrees 03 minutes 06 seconds N. and long. 94 degrees 59 minutes 28 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few medium rounded strong brown (7.5YR 5/8) masses of iron; common fine fragments of snail shells; slightly effervescent; slightly alkaline; clear smooth boundary.

A1—8 to 17 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common medium black (10YR 2/1) wormcasts; slightly effervescent; slightly alkaline; gradual wavy boundary.

A2—17 to 31 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; common medium black (10YR 2/1) wormcasts; slightly effervescent; moderately alkaline; gradual wavy boundary.

A3—31 to 42 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; few fine prominent light brownish gray (2.5Y 6/2) redoximorphic depletions; slightly effervescent; moderately alkaline; gradual wavy boundary.

A4—42 to 50 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bg—50 to 65 inches; very dark gray (N 3/0) silty clay loam; weak fine and medium angular blocky structure parting to weak fine and medium subangular blocky; friable; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg—65 to 80 inches; very dark gray (N 3/0) silty clay

loam; massive; friable; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Thickness of the mollic epipedon:* More than 30 inches

*Ap or A horizon:*
Hue—10YR, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—slightly alkaline or moderately alkaline

*Bg horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 to 2
Texture—silty clay loam or silt loam
Reaction—slightly alkaline or moderately alkaline

*Cg horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 to 2
Texture—silty clay loam, silt loam, or loam
Reaction—slightly alkaline or moderately alkaline

## Calcousta Series

### *Typical Pedon*

Calcousta silty clay loam, depressional, 0 to 1 percent slopes, 2,400 feet north and 300 feet west of the southeast corner of sec. 20, T. 91 N., R. 27 W.; USGS Thor topographic quadrangle; lat. 42 degrees 40 minutes 47 seconds N. and long. 94 degrees 03 minutes 01 second W., NAD 27:

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; many fine and medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

Bkg—10 to 14 inches; olive gray (5Y 4/2) silty clay loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; very few prominent very dark gray (10YR 3/1) organic coatings; common fine rounded light gray (10YR 7/2) carbonate concretions; common fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; clear smooth boundary.

Cg1—14 to 30 inches; olive gray (5Y 5/2) silty clay loam; massive; friable; common fine and medium roots; common fine rounded light gray (10YR 7/2) carbonate concretions; common fine prominent brown (7.5YR 4/4) and strong brown (7.5YR 4/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Cg2—30 to 45 inches; olive gray (5Y 5/2) silt loam; massive; friable; common fine and medium roots; common fine rounded light gray (10YR 7/2) carbonate concretions; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) redoximorphic concentrations; violently effervescent; moderately alkaline; gradual smooth boundary.

Cg3—45 to 60 inches; olive gray (5Y 5/2) silt loam; massive; friable; common fine and medium roots; common fine rounded light gray (10YR 7/2) carbonate concretions; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) redoximorphic concentrations; violently effervescent; slightly alkaline.

### *Range in Characteristics*

*Thickness of the solum:* 10 to 24 inches
*Depth to carbonates:* 0 to 10 inches
*Thickness of the mollic epipedon:* 9 to 18 inches

*Ap or A horizon:*
Hue—10YR or N
Value—2
Chroma—0 or 1
Texture—silty clay loam
Reaction—slightly alkaline or moderately alkaline

*Bkg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam
Reaction—slightly alkaline or moderately alkaline

*Cg horizon:*
Hue—5Y
Value—5 or 6
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

## Canisteo Series

### *Typical Pedon*

Canisteo clay loam, 0 to 2 percent slopes, in a cultivated field; 1,600 feet west and 100 feet south of the northeast corner of sec. 4, T. 97 N., R. 35 W., Lake Township; USGS Terril, Iowa, topographic quadrangle;

lat. 43 degrees 15 minutes 16 seconds N. and long. 94 degrees 58 minutes 45 seconds W., NAD 27:

Ap—0 to 8 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; weak fine granular structure; friable; common very fine roots; about 5 percent fine gravel; strongly effervescent; slightly alkaline; gradual smooth boundary.

A—8 to 17 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; common very fine roots; about 5 percent gravel; strongly effervescent; slightly alkaline; gradual smooth boundary.

AB—17 to 23 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; weak fine and medium granular structure; friable; common very fine roots; about 5 percent gravel; common medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bkg1—23 to 36 inches; olive gray (5Y 5/2) loam; moderate medium subangular blocky structure; friable; common fine rounded very pale brown (10YR 8/2) carbonate nodules; few medium rounded yellowish red (5YR 4/6) masses of iron and common fine rounded black (10YR 2/1) iron-manganese nodules; about 5 percent gravel; common medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bkg2—36 to 64 inches; light olive gray (5Y 6/2) loam; moderate medium subangular blocky structure; friable; common fine rounded very pale brown (10YR 8/2) calcium carbonate nodules; few medium rounded yellowish red (5YR 4/6) masses of iron; common fine rounded black (10YR 2/1) iron-manganese nodules; about 5 percent gravel; common medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

Cg—64 to 80 inches; light olive gray (5Y 6/2) sandy loam; massive; friable; about 5 percent gravel; slightly effervescent; slightly alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 0 to 10 inches
*Thickness of the mollic epipedon:* 14 to 24 inches

*Ap and A horizons:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

*Bkg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—clay loam, loam, silty clay loam, silt loam, or sandy loam
Reaction—slightly alkaline or moderately alkaline

*Cg horizon:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 to 4
Texture—loam or sandy loam
Reaction—slightly alkaline or moderately alkaline

## *Clarion Series*

*Taxadjunct features:* The Clarion soils in map units 138C2 and 638C2 do not have a mollic epipedon. These soils are classified as fine-loamy, mixed, superactive, mesic Typic Eutrudepts.

### *Typical Pedon*

Clarion loam, 2 to 5 percent slopes, in a cultivated field; 63 feet west and 1,400 feet north of the southeast corner of sec. 21, T. 95 N., R. 35 W., Logan Township; USGS Silver Lake, Iowa, topographic quadrangle; lat. 43 degrees 01 minute 38 seconds N. and long. 94 degrees 58 minutes 23 seconds W., NAD 27:

Ap—0 to 8 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; friable; common fine and medium roots; about 1 percent gravel; neutral; abrupt smooth boundary.

AB—8 to 16 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; friable; common fine and medium roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; about 1 percent gravel; neutral; clear wavy boundary.

Bw1—16 to 23 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; common fine and medium roots; few distinct dark brown (10YR 3/3) organic coatings on faces of peds; about 1 percent gravel; neutral; gradual smooth boundary.

Bw2—23 to 31 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable; common distinct brown

(10YR 3/3) organic coatings on faces of peds; about 1 percent gravel; neutral; clear wavy boundary.

Bk—31 to 39 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; common fine and medium very pale brown (10YR 8/2) calcium carbonate threads; about 3 percent gravel; slightly effervescent; slightly alkaline; abrupt wavy boundary.

C1—39 to 54 inches; mixed yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) loam; massive; friable; common medium and coarse very pale brown (10YR 8/2) calcium carbonate threads; about 3 percent gravel; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline; gradual smooth boundary.

C2—54 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; common coarse yellowish red (5YR 4/6) masses of iron; common fine and medium very pale brown (10YR 8/2) masses of calcium carbonate; about 3 percent gravel; common fine and medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine and medium prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 18 to 50 inches
*Thickness of the mollic epipedon:* 10 to 20 inches

*Ap and AB horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—neutral or slightly acid

*Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—loam
Reaction—neutral or slightly acid

*Bk and C horizons:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—loam or sandy loam
Reaction—slightly alkaline or moderately alkaline

## Coland Series

### Typical Pedon

Coland clay loam, 0 to 2 percent slopes, occasionally flooded, in a pasture; 1,734 feet east and 207 feet south of the northwest corner of sec. 23, T. 97 N., R. 36 W., Meadow Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 12 minutes 43 seconds N. and long. 95 degrees 03 minutes 57 seconds W., NAD 27:

A1—0 to 7 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; neutral; clear smooth boundary.

A2—7 to 16 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; neutral; gradual smooth boundary.

A3—16 to 23 inches; black (N 2/0) clay loam, black (10YR 2/1) dry; weak medium and fine subangular blocky structure; friable; neutral; gradual smooth boundary.

A4—23 to 31 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak medium and fine angular and subangular blocky structure; friable; few fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; neutral; clear smooth boundary.

A5—31 to 42 inches; very dark gray (10YR 3/1) silty clay loam that has a high content of fine sand; dark gray (10YR 4/1) dry; weak medium and fine angular and subangular blocky structure; friable; common medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations and coatings on faces of peds; neutral; clear smooth boundary.

AC—42 to 48 inches; black (5Y 2/1) clay loam that has a high content of fine sand; weak fine prismatic structure parting to weak fine subangular blocky; friable; neutral; abrupt wavy boundary.

C1—48 to 68 inches; black (5Y 2/1) clay loam; massive; friable; slightly effervescent; slightly alkaline; clear smooth boundary.

C2—68 to 80 inches; black (5Y 2/1) sandy loam; single grain; loose; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 48 to 60 inches
*Thickness of the mollic epipedon:* 36 inches or more

*A horizon:*
Hue—10YR or N

Value—2 or 3
Chroma—0 or 1
Texture—clay loam or silty clay loam
Reaction—slightly acid or neutral

*AC horizon:*
Hue—10YR to 5Y or N
Value—2 to 4
Chroma—0 to 2
Texture—clay loam or loam
Reaction—slightly acid or neutral

*C horizon:*
Hue—2.5Y, 5Y, or N
Value—2 to 5
Chroma—0 to 2
Texture—clay loam, loam, or sandy loam
Reaction—slightly acid to slightly alkaline

## Collinwood Series

### Typical Pedon

Collinwood clay, 1 to 3 percent slopes, in a cultivated field; 465 feet south and 2,000 feet east of the northwest corner of sec. 13, T. 96 N., R. 36 W., Sioux Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 08 minutes 02 seconds N. and long. 95 degrees 02 minutes 35 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) clay, very dark gray (10YR 3/1) dry; moderate very fine and fine granular structure; very firm; common very fine roots; slightly alkaline; abrupt smooth boundary.

A1—8 to 13 inches; black (10YR 2/1) clay, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; very firm; few very fine roots; neutral; clear smooth boundary.

A2—13 to 17 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; very firm; few very fine roots; common distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg—17 to 24 inches; dark grayish brown (2.5Y 4/2) clay; strong fine angular blocky structure; very firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) pressure faces; few fine rounded black (N 2/0) iron-manganese concretions; common fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Bkg1—24 to 32 inches; dark grayish brown (2.5Y 4/2) clay; strong fine angular blocky structure; very firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) pressure faces; common fine and medium irregular very pale brown (10YR 8/2) calcium carbonate nodules; common fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bkg2—32 to 41 inches; grayish brown (2.5Y 5/2) clay; strong very fine prismatic structure parting to strong fine and medium angular blocky; very firm; common distinct very dark gray (10YR 3/1) organic coatings on faces of prisms and peds; common fine and medium irregular very pale brown (10YR 8/2) calcium carbonate nodules; common fine and medium distinct light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bkg3—41 to 53 inches; grayish brown (2.5Y 5/2) silty clay; strong very fine prismatic structure parting to strong medium angular blocky; very firm; common distinct very dark gray (10YR 3/1) organic coatings on faces of prisms and peds; common fine and medium irregular very pale brown (10YR 8/2) calcium carbonate nodules; common fine and medium distinct light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

BCg—53 to 65 inches; mixed light olive brown (2.5Y 5/4) and olive gray (5Y 5/2) clay; strong fine prismatic structure; very firm; few fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Cg—65 to 80 inches; mixed light olive brown (2.5Y 5/4) and olive gray (5Y 5/2) clay; massive; very firm; few fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 24 to 46 inches
*Thickness of the mollic epipedon:* 14 to 24 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3

Chroma—1
Texture—clay

*Bg and Bkg horizon:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 in the upper part; 2 to 4 in the lower part
Texture—clay or silty clay

*BCg and Cg horizons:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2 to 4
Texture—clay, silty clay, silty clay loam, or silt loam

## Colo Series

### Typical Pedon

Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field; 600 feet north and 30 feet west of the southeast corner of sec. 8, T. 94 N., R. 36 W., Herdland Township; USGS Webb, Iowa, topographic quadrangle; lat. 42 degrees 56 minutes 15 seconds N. and long. 95 degrees 06 minutes 45 seconds W., NAD 27:

Ap—0 to 8 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; weak fine granular and weak fine subangular blocky structure; friable; common fine roots; neutral; abrupt smooth boundary.

A1—8 to 19 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; moderate fine and medium subangular blocky and angular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

A2—19 to 28 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; weak fine and medium subangular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

A3—28 to 40 inches; black (N 2/0 and 10YR 2/1) silty clay loam, black (10YR 2/1) and very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

A4—40 to 48 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

Cg—48 to 80 inches; very dark gray (10YR 3/1) and very dark grayish brown (2.5Y 3/2) silty clay loam; massive; friable; neutral.

### Range in Characteristics

*Depth to carbonates:* More than 60 inches
*Thickness of the mollic epipedon:* More than 36 inches

*A horizon:*
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—neutral to moderately acid

*BCg horizon (if it occurs):*
Hue—10YR to 5Y or N
Value—3 to 6
Chroma—0 to 2
Texture—silty clay loam
Reaction—neutral to moderately acid

*Cg horizon:*
Hue—10YR to 5Y or N
Value—3 to 6
Chroma—0 to 2
Texture—silty clay loam, silt loam, or clay loam
Reaction—neutral or slightly acid

## Cornell Series

### Typical Pedon

Cornell silty clay loam, 18 to 25 percent slopes, in a pastured area of woodland; 400 feet east and 1,000 feet north of the southwest corner of sec. 28, T. 94 N., R. 36 W., Herdland Township; USGS Sioux Rapids, Iowa, topographic quadrangle; lat. 42 degrees 55 minutes 44 seconds N. and long. 95 degrees 06 minutes 30 seconds W., NAD 27:

A1—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common fine to coarse roots; slightly acid; clear smooth boundary.

A2—6 to 11 inches; very dark brown (10YR 2/2) (interior) and black (10YR 2/1) (exterior) silty clay loam, grayish brown (10YR 5/2) and dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; common fine to coarse roots; about 2 percent gravel; moderately acid; clear smooth boundary.

AB—11 to 16 inches; very dark grayish brown (10YR 3/2) (interior) and black (10YR 2/1) and very dark brown (10YR 2/2) (exterior) silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common fine to coarse

roots; about 1 percent gravel; slightly acid; clear smooth boundary.

Bt1—16 to 21 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; common fine to coarse roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in root channels; about 4 percent gravel; common fine prominent red (2.5YR 4/6) masses of iron on faces of peds; moderately acid; clear smooth boundary.

2Bt2—21 to 30 inches; dark yellowish brown (10YR 4/4) clay; moderate fine prismatic structure parting to strong fine and medium subangular blocky; firm; common fine to coarse roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in root channels; few fine and medium red (2.5YR 4/6) masses of iron on faces of peds; about 4 percent gravel; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; common medium distinct dark grayish brown (10YR 4/2) redoximorphic depletions; strongly acid; clear smooth boundary.

2Bt3—30 to 43 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) clay; moderate medium prismatic structure parting to strong medium angular blocky; firm; common fine to coarse roots; few fine and medium red (2.5YR 4/6) masses of iron on faces of peds; about 6 percent gravel; common fine prominent strong brown (7.5YR 4/6) and common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations on faces of peds; strongly acid; abrupt wavy boundary.

2Bt4—43 to 54 inches; dark yellowish brown (10YR 4/4) clay loam; moderate coarse prismatic structure parting to moderate medium and coarse angular blocky; firm; common fine roots between peds; about 3 percent gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bt5—54 to 62 inches; yellowish brown (10YR 5/6) clay loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common fine roots; few prominent very dark grayish brown (10YR 3/2) clay films on faces of peds; about 8 percent gravel; common fine prominent grayish brown (10YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Bt6—62 to 70 inches; yellowish brown (10YR 5/6) clay loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common fine roots; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; about 9 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

2BC—70 to 80 inches; yellowish brown (10YR 5/6) clay loam; weak very coarse prismatic structure; firm; common fine roots; few prominent very dark grayish brown (10YR 3/2) clay films on faces of peds; about 7 percent gravel; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* More than 40 inches
*Thickness of the mollic epipedon:* 10 to 20 inches
*Depth to till:* 10 to 30 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or clay loam
Reaction—moderately acid or slightly acid

*Bt and 2Bt horizons:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—clay loam, silty clay loam, silty clay, or clay
Reaction—strongly acid to moderately alkaline

*2BC horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## *Crippin Series*

### *Typical Pedon*

Crippin loam, 1 to 3 percent slopes, in a cultivated field; 225 feet north and 1,320 feet west of the southeast corner of sec. 3, T. 94 N., R. 35 W., Garfield Township; USGS Rush Lake, Iowa, topographic quadrangle; lat. 42 degrees 58 minutes 59 seconds N. and long. 94 degrees 57 minutes 30 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; slightly alkaline; abrupt wavy boundary.

A1—8 to 14 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; slightly effervescent; slightly alkaline; gradual smooth boundary.

A2—14 to 18 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; about 2 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—18 to 24 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; friable; common distinct very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 2 percent gravel; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bk1—24 to 28 inches; mottled dark grayish brown (10YR 4/2), grayish brown (2.5Y 5/2), and yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—28 to 39 inches; grayish brown (2.5Y 4/2) loam; moderate fine and medium subangular blocky structure; friable; common fine dark manganese concretions; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; many fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; strongly effervescent; moderately alkaline; abrupt wavy boundary.

C1—39 to 55 inches; mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) loam; massive; friable; many fine dark manganese concretions; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—55 to 68 inches; yellowish brown (10YR 5/4) loam; massive; friable; many fine dark manganese concretions; common fine irregular very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; common fine and medium prominent grayish brown (2.5YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—68 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; common fine dark manganese concretions; about 3 percent gravel; many medium prominent strong grayish brown (2.5YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 0 to 10 inches
*Thickness of the mollic epipedon:* 12 to 20 inches

*Ap and A horizons:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—loam
Reaction—slightly alkaline or moderately alkaline

*Bw horizon:*
Hue—10YR or 2.5Y
Value—4
Chroma—2
Texture—loam
Reaction—slightly alkaline or moderately alkaline

*Bk horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

*C horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## *Cylinder Series*

### *Typical Pedon*

Cylinder loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes, in a cultivated field; 123 feet south and 1,278 feet east of the northwest corner of sec. 11, T. 96 N., R. 38 W., Lone Tree Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 09 minutes 18 seconds N. and long. 95 degrees 18 minutes 12 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

A1—8 to 14 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; slightly acid; gradual smooth boundary.

A2—14 to 18 inches; very dark grayish brown (2.5Y 3/2) loam, grayish brown (2.5Y 5/2) dry; weak fine granular structure; friable; common very fine and fine roots; few very dark grayish brown (10YR 3/2) and black (10YR 2/1) coatings on faces of peds; neutral; clear smooth boundary.

Bg1—18 to 24 inches; dark grayish brown (2.5Y 4/2) clay loam; weak fine and medium subangular

blocky structure; friable; common very fine and fine roots; very dark grayish brown (2.5Y 3/2) and very dark gray (10YR 3/1) coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bg2—24 to 28 inches; mixed dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/3) loam; very weak fine subangular blocky structure; friable; common fine very dark grayish brown (2.5Y 3/2) dark masses; about 5 percent gravel; common fine faint dark yellowish brown (10YR 4/4) redoximorphic concentrations; neutral; clear smooth boundary.

2BC—28 to 39 inches; dark brown (10YR 3/3) and dark yellowish brown (10YR 3/4) medium and coarse sand; single grain; loose; about 5 percent gravel; slightly effervescent; slightly alkaline; gradual smooth boundary.

2C1—39 to 50 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) very gravelly loamy sand; single grain; loose; about 35 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2C2—50 to 80 inches; light brownish gray (10YR 6/2) and pale brown (10YR 6/3) very gravelly loamy sand; single grain; loose; about 35 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 14 to 24 inches
*Depth to contrasting material:* 24 to 40 inches

*Ap and A horizons:*
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—moderately acid to neutral

*Bg horizon:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 or 3
Texture—loam or clay loam
Reaction—slightly acid or neutral

*2BC and 2C horizons:*
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—2 to 8
Texture—sand or loamy sand or the gravelly or very gravelly analogs of these textures
Reaction—slightly alkaline or moderately alkaline

## Dickinson Series

*Taxadjunct features:* The Dickinson soil in map unit 874C2 does not have a mollic epipedon. This soil is classified as a coarse-loamy, mixed, superactive, mesic Typic Eutrudept.

### Typical Pedon

Dickinson fine sandy loam, 2 to 5 percent slopes, in a cultivated field; 1,700 feet south and 1,000 feet west of the northeast corner of sec. 32, T. 96 N., R. 36 W., Sioux Township; USGS Gillette Grove, Iowa, topographic quadrangle; lat. 43 degrees 05 minutes 43 seconds N. and long. 95 degrees 07 minutes 07 seconds W., NAD 27:

Ap—0 to 7 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak very fine granular structure; very friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.

AB—7 to 13 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure parting to weak fine granular; very friable; common very fine and fine roots; moderately acid; clear smooth boundary.

Bw1—13 to 24 inches; brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; very friable; common very fine and fine roots; moderately acid; gradual smooth boundary.

Bw2—24 to 31 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine and medium subangular blocky structure; very friable; common very fine and fine roots; moderately acid; diffuse smooth boundary.

BC—31 to 41 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) loamy sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; slightly acid; clear smooth boundary.

C1—41 to 64 inches; yellowish brown (10YR 5/4) sand; single grain; loose; slightly acid; clear smooth boundary.

C2—64 to 80 inches; yellowish brown (10YR 5/4) sand; single grain; loose; few fine white (10YR 8/1) calcium carbonate concretions between sand grains; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 12 to 24 inches
*Depth to carbonates:* 60 inches or more
*Other features:* A lacustrine substratum phase is

recognized. The lacustrine material is below a depth of 60 inches. It has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 to 4. The texture is silt loam, silty clay loam, silty clay, or clay. Reaction ranges from slightly acid to moderately alkaline.

*Ap and AB horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—fine sandy loam
Reaction—neutral to moderately acid

*Bw horizon:*
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture—sandy loam or fine sandy loam
Reaction—slightly acid or moderately acid

*BC and C horizons:*
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—loamy fine sand, loamy sand, fine sand, or sand
Reaction—slightly acid or moderately acid

## Dickman Series

### Typical Pedon

Dickman sandy loam, on a convex slope of 1 percent, in a cultivated field; about 1.5 miles north of Redwood Falls, in Redwood County, Minnesota; 2,240 feet west and 2,500 feet south of the northeast corner of sec. 25, T. 113 N., R. 36 W.; USGS Redwood Falls quadrangle; lat. 44 degrees 33 minutes 53 seconds N. and long. 95 degrees 07 minutes 21 seconds W., NAD 27:

Ap—0 to 10 inches; black (10YR 2/1) sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

A—10 to 12 inches; very dark gray (10YR 3/1) sandy loam, dark brown (10YR 3/3) dry; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bw1—12 to 16 inches; brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

Bw2—16 to 19 inches; dark brown (10YR 4/3) sandy loam; dark grayish brown (10YR 4/2) on faces of peds; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

2Bw3—19 to 33 inches; dark brown (10YR 4/3) loamy sand; single grain; loose; neutral; clear smooth boundary.

2C1—33 to 68 inches; yellowish brown (10YR 5/4) coarse sand; single grain; loose; neutral; gradual wavy boundary.

2C2—68 to 80 inches; brown (10YR 5/3) sand; single grain; loose; slightly effervescent; slightly alkaline.

### Range in Characteristics

*A or Ap horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—fine sandy loam, coarse sandy loam, or sandy loam
Reaction—slightly acid or moderately acid

*Bw horizon:*
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—3 or 4
Texture—coarse sandy loam, fine sandy loam, or sandy loam
Reaction—moderately acid to neutral

*2Bw horizon:*
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—loamy sand, loamy fine sand, fine sand, coarse sand, or sand
Reaction—moderately acid to neutral

*2C horizon:*
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—coarse sand, sand, or fine sand or strata with these textures
Reaction—slightly acid to slightly alkaline

## Estherville Series

*Taxadjunct features:* The Estherville soil in map unit 541C does not have a mollic epipedon. This soil is classified as a sandy, mixed, mesic Typic Eutrudept.

### Typical Pedon

Estherville sandy loam, in an area of Estherville-Hawick complex, 5 to 9 percent slopes, in a cultivated field; 320 feet west and 2,340 feet south of the northeast corner of sec. 23, T. 94 N., R. 35 W., Garfield Township;

USGS Rush Lake West, Iowa, topographic quadrangle; lat. 42 degrees 56 minutes 50 seconds N. and long. 94 degrees 56 minutes 06 seconds W., NAD 27:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

Bw—7 to 18 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine and medium subangular blocky structure; very friable; common very fine and fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

2C1—18 to 37 inches; brown (10YR 4/3) very gravelly sand; single grain; loose; about 45 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

2C2—37 to 60 inches; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; about 55 percent gravel; strongly effervescent; slightly alkaline; gradual smooth boundary.

2C3—60 to 80 inches; yellowish brown (10YR 5/4) very gravelly coarse sand; single grain; loose; about 59 percent gravel; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Thickness of the loamy mantle:* 10 to 20 inches
*Thickness of the mollic epipedon:* 7 to 20 inches
*Depth to carbonates:* 18 to 30 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—sandy loam
Reaction—neutral to moderately acid

*Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—sandy loam
Reaction—neutral to moderately acid

*2C horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—very gravelly sand or very gravelly coarse sand
Reaction—neutral to moderately alkaline

## Everly Series

*Taxadjunct features:* The Everly soils in map units 577C2 and 637D2 do not have a mollic epipedon. These soils are classified as fine-loamy, mixed, superactive, mesic Typic Eutrudepts.

### Typical Pedon

Everly clay loam, 2 to 5 percent slopes, in a cultivated field; 880 feet north and 340 feet east of the southwest corner of sec. 13, T. 97 N., R. 37 W., Summit Township; USGS Spencer, Iowa, topographic quadrangle; lat. 43 degrees 12 minutes 57 seconds N. and long. 95 degrees 10 minutes 06 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.

A—8 to 12 inches; black (10YR 2/1) clay loam with a few small streaks and pockets of very dark grayish brown (10YR 3/2) clay loam; very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; common fine and very fine roots; moderately acid; gradual smooth boundary.

BA—12 to 16 inches; mixed black (10YR 2/1) and very dark grayish brown (10YR 3/2) clay loam; moderate fine and very fine subangular blocky structure; friable; common fine and very fine roots; slightly acid; gradual smooth boundary.

Bw1—16 to 20 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; about 2 percent gravel; slightly acid; gradual smooth boundary.

Bw2—20 to 26 inches; brown (10YR 4/3) clay loam; weak fine subangular blocky structure; friable; common very fine and fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; a thin discontinuous band of pebbles in the lower part of the horizon; about 3 percent gravel; neutral; clear smooth boundary.

2Bk1—26 to 36 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; firm; few white (10YR 8/1) calcium carbonate nodules in the lower part; about 3 percent gravel; few fine distinct dark gray (10YR 3/1) redoximorphic depletions in the lower part; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Bk2—36 to 50 inches; yellowish brown (10YR 5/4) loam; weak fine prismatic structure; firm; common white (10YR 8/1) calcium carbonate nodules; about 5 percent gravel; few fine distinct grayish brown (10YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual smooth boundary.

2BC1—50 to 62 inches; yellowish brown (10YR 5/4) loam; weak and moderate coarse prismatic structure; firm; common white (10YR 8/1) calcium carbonate nodules; about 5 percent gravel; common medium faint dark yellowish brown (10YR 4/4) redoximorphic concentrations; few fine distinct grayish brown (10YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual smooth boundary.

2BC2—62 to 80 inches; yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) clay loam; moderate coarse and very coarse prismatic structure; firm; common white (10YR 8/1) calcium carbonate nodules; about 7 percent gravel; few medium and fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 16 to 36 inches
*Thickness of the mollic epipedon:* 10 to 20 inches
*Depth to till:* 16 to 36 inches

*A or Ap horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—clay loam
Reaction—neutral to moderately acid

*BA horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—clay loam
Reaction—neutral to moderately acid

*Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—clay loam or loam
Reaction—slightly acid or neutral

*2Bk or 2BC horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Fairhaven Series

### Typical Pedon

Fairhaven silt loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes, in a cultivated field; 50 feet north and 610 feet east of the southwest corner of sec. 34, T. 97 N., R. 38 W., Waterford Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 10 minutes 15 seconds N. and long. 95 degrees 15 minutes 00 seconds W., NAD 27:

Ap—0 to 7 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common fine roots; moderately acid; abrupt smooth boundary.

A—7 to 12 inches; black (10YR 2/1) and very dark brown (10YR 2/2) silt loam, very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) dry; weak fine granular and weak fine subangular blocky structure; friable; common fine roots; moderately acid; clear smooth boundary.

Bw1—12 to 17 inches; dark brown (10YR 3/3) silt loam, brown (10YR 4/3) and very dark grayish brown (10YR 3/2) dry; weak fine and medium subangular blocky structure; friable; common fine roots; very dark brown (10YR 2/2) organic coatings on faces of peds; moderately acid; clear smooth boundary.

Bw2—17 to 28 inches; brown (10YR 4/3) and dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable; common fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately acid; clear smooth boundary.

Bw3—28 to 36 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable; brown (7.5YR 4/4) iron stains on faces of peds; neutral; clear smooth boundary.

2BC—36 to 39 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine subangular blocky structure; friable; brown (7.5YR 4/4) iron stains on faces of peds; about 3 percent gravel; slightly effervescent; moderately alkaline; gradual smooth boundary.

2C1—39 to 48 inches; dark yellowish brown (10YR 4/4) coarse sand; single grain; loose; about 3 percent gravel; strongly effervescent; moderately alkaline; gradual smooth boundary.

2C2—48 to 55 inches; yellowish brown (10YR 5/4) sand; single grain; loose; about 5 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

2C3—55 to 80 inches; yellowish brown (10YR 5/4) coarse sand; single grain; loose; about 5 percent gravel; very slightly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 20 to 50 inches
*Thickness of the mollic epipedon:* 10 to 22 inches
*Depth to contrasting material:* 22 to 40 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or silt loam
Reaction—neutral to moderately acid

*Bw horizon:*
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—loam or silt loam
Reaction—neutral to moderately acid

*2BC horizon:*
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—sandy loam
Reaction—slightly acid to moderately alkaline

*2C horizon:*
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 5
Texture—gravelly coarse sand, coarse sand, or sand
Reaction—slightly alkaline or moderately alkaline

## *Fostoria Series*

### *Typical Pedon*

Fostoria loam, 1 to 3 percent slopes, in a cultivated field; 125 feet north and 150 feet west of the southeast corner of sec. 29, T. 97 N., R. 38 W., Waterford Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 11 minutes 03 seconds N. and long. 95 degrees 20 minutes 54 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) loam, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

A1—7 to 15 inches; black (N 2/0) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; neutral; gradual smooth boundary.

A2—15 to 19 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; some mixing of dark grayish brown (2.5Y 4/2); weak very fine subangular blocky and weak fine granular structure; friable; common very fine and fine roots; neutral; gradual smooth boundary.

Bg1—19 to 24 inches; dark grayish brown (2.5Y 4/2) loam; very weak fine subangular blocky structure; friable; common very fine roots; very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bg2—24 to 29 inches; dark grayish brown (2.5Y 4/2) loam; weak fine subangular blocky structure; friable; common very fine roots; common fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; neutral; gradual smooth boundary.

Bk—29 to 34 inches; olive brown (2.5Y 4/4) loam; weak fine and medium subangular blocky structure; friable; common very fine roots; common fine and medium very pale brown (10YR 8/2) calcium carbonate concretions; fine distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; abrupt wavy boundary.

2C—34 to 42 inches; light olive brown (2.5Y 5/4) silt loam; massive; friable; common fine and medium rounded very pale brown (10YR 8/2) calcium carbonate concretions; common fine distinct yellowish brown (10YR 5/6 and 5/8) redoximorphic concentrations; common medium prominent gray (10YR 5/1) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Cg1—42 to 60 inches; gray (10YR 5/1) silt loam; massive; friable; common fine and medium very pale brown (10YR 8/2) calcium carbonate concretions; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Cg2—60 to 68 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; many fine and medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; abrupt wavy boundary.

3C—68 to 80 inches; yellowish brown (10YR 5/6)

loam; massive; firm; about 3 percent gravel; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 24 to 48 inches
*Thickness of the mollic epipedon:* 12 to 24 inches
*Other features:* A lacustrine substratum phase is recognized. The lacustrine material is below a depth of 60 inches. It has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 1 to 4. The texture is silt loam, silty clay loam, silty clay, or clay. Reaction is slightly alkaline or moderately alkaline.

*Ap and A horizons:*
Hue—10YR or N
Value—2
Chroma—0 or 1
Texture—loam
Reaction—slightly acid or neutral

*BA or AB horizon (if it occurs):*
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—2
Texture—loam, silt loam, or clay loam
Reaction—slightly acid or neutral

*Bg and Bk horizons:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—loam, silt loam, or clay loam
Reaction—neutral to moderately alkaline

*2Cg horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 4
Texture—silt loam or loam
Reaction—slightly alkaline or moderately alkaline

*3C horizon:*
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Galva Series

### Typical Pedon

Galva silty clay loam, terrace, 2 to 5 percent slopes, in a cultivated field; 1,170 feet south and 415 feet east of the northwest corner of sec. 33, T. 94 N., R. 36 W., Webb Township; USGS Webb, Iowa, topographic quadrangle; lat. 42 degrees 55 minutes 17 seconds N. and long. 95 degrees 06 minutes 36 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.
A—8 to 18 inches; black (10YR 2/1) and very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; friable; slightly acid; clear smooth boundary.
Bw1—18 to 25 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; slightly acid; clear smooth boundary.
Bw2—25 to 34 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine and medium subangular blocky structure; friable; slightly acid; clear smooth boundary.
Bw3—34 to 48 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) silty clay loam; weak medium and coarse subangular blocky structure; friable; slightly acid; gradual smooth boundary.
BC—48 to 69 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium prismatic structure parting to weak medium and coarse subangular blocky; friable; few distinct dark brown (10YR 3/3) organic coatings on faces of peds; slightly effervescent; moderately alkaline; clear smooth boundary.
C—69 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 20 inches
*Depth to contrasting material:* More than 60 inches

*Ap horizon:*
Hue—10YR
Value—2
Chroma—1 or 2
Texture—silty clay loam
Reaction—slightly acid or moderately acid

*Bw and BC horizons:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silt loam

Reaction—slightly acid or neutral in the Bw horizon; neutral to moderately alkaline in the BC horizon

*C horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—dominantly silt loam; moderately coarse substratum phases of fine sand, loamy sand, or sand are recognized
Reaction—slightly alkaline or moderately alkaline

## Gillett Grove Series

### Typical Pedon

Gillett Grove silty clay loam, 0 to 2 percent slopes, in a cultivated field; 2,500 feet west and 2,000 feet north of the southeast corner of sec. 19, T. 95 N., R. 36 W., Gillette Grove Township; USGS Greenville, Iowa, topographic quadrangle; lat. 43 degrees 01 minute 50 seconds N. and long. 95 degrees 08 minutes 26 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A—7 to 11 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; neutral; gradual smooth boundary.

AB—11 to 16 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; common medium prominent dark gray (5Y 4/1) redoximorphic depletions; neutral; gradual smooth boundary.

Bg1—16 to 22 inches; dark gray (2.5Y 4/1) silty clay loam; moderate fine and medium angular and subangular blocky structure; friable; common very dark gray (5Y 3/1) organic coatings on faces of peds; common fine dark manganese concretions that increase in abundance with increasing depth; common medium distinct dark gray (5Y 4/1) redoximorphic depletions; neutral; gradual smooth boundary.

Bg2—22 to 42 inches; olive gray (5Y 4/2) silty clay loam; weak fine and medium subangular blocky structure; friable; common fine dark manganese concretions; common fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common medium faint dark gray (5Y 4/1) redoximorphic depletions; slightly effervescent; slightly alkaline; gradual wavy boundary.

BCg1—42 to 48 inches; grayish brown (2.5Y 5/2) silt loam; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable; common fine dark manganese concretions that increase in abundance with increasing depth; white (10YR 8/1) and pale brown (10YR 7/1) calcium carbonate coatings on faces of peds and root channels; common medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual wavy boundary.

2BCg2—48 to 80 inches; grayish brown (2.5Y 5/2) clay loam; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable; common fine dark manganese concretions; white (10YR 8/1) calcium carbonate coatings on faces of peds; about 3 percent gravel; common fine and medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 24 to 48 inches
*Thickness of the mollic epipedon:* 14 to 24 inches
*Depth to till:* 40 to 60 inches

*A horizon:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam or silty clay
Reaction—slightly acid to moderately alkaline

*BCg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silt loam
Reaction—slightly alkaline or moderately alkaline

*2BCg horizon:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Guckeen Series

### Typical Pedon

Guckeen silty clay loam, on a slightly convex slope of 2 percent, in a cultivated field; in Waseca County, Minnesota; about 2 miles south and 4 miles west of Waldorf; 100 feet east and 100 feet north of the southwest corner of sec. 7, T. 105 N., R. 24 W.; USGS Mapleton Northeast topographic quadrangle; lat. 43 degrees 54 minutes 22 seconds N. and long. 93 degrees 46 minutes 04 seconds W., NAD 83:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; weak very fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

A1—8 to 12 inches; black (10YR 2/1) silty clay; moderate fine subangular blocky structure; friable; moderately acid; clear smooth boundary.

A2—12 to 15 inches; very dark gray (10YR 3/1) silty clay; moderate fine subangular blocky structure; friable; moderately acid; clear smooth boundary.

Bw1—15 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay; strong fine angular blocky structure; firm; very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) coatings on faces of peds; common very dark gray (10YR 3/1) earthworm casts; moderately acid; clear smooth boundary.

Bw2—18 to 24 inches; grayish brown (2.5Y 4/2) silty clay; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; dark grayish brown (10YR 4/2) coatings on faces of peds; moderately acid; clear smooth boundary.

2Bw3—24 to 30 inches; grayish brown (2.5Y 5/2) clay loam; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; dark grayish brown (10YR 4/2) coatings on faces of peds; about 5 percent rock fragments; slightly acid; clear smooth boundary.

2C—30 to 60 inches; grayish brown (2.5Y 5/2) clay loam; massive; friable; about 5 percent rock fragments; common medium faint olive gray (5Y 5/2) redoximorphic depletions; many fine prominent olive (5Y 5/6) and few medium prominent red (2.5YR 4/8) redoximorphic concentrations; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 18 to 44 inches
*Thickness of the mollic epipedon:* 12 to 24 inches
*Depth to till:* 20 to 40 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or silty clay
Reaction—moderately acid to neutral

*Bw horizon:*
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 or 3
Texture—silty clay loam, silty clay, or clay
Reaction—moderately acid to neutral

*2Bw horizon:*
Hue—2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly acid or neutral

*2C horizon:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Hanlon Series

### Typical Pedon

Hanlon fine sandy loam, 0 to 2 percent slopes, occasionally flooded, 250 feet north and 450 feet west of the southeast corner of sec. 31, T. 92 N., R. 28 W.; in Humboldt County, Iowa; USGS Humboldt, Iowa, topographic quadrangle; lat. 42 degrees 43 minutes 58 seconds N. and long. 94 degrees 11 minutes 23 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) fine sandy loam, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; common fine roots; slightly acid; clear smooth boundary.

A1—8 to 17 inches; black (10YR 2/1) and very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak very fine and medium subangular blocky structure; very friable; common medium roots; moderately acid; clear smooth boundary.

A2—17 to 28 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium subangular blocky structure; very friable; common medium roots; slightly acid; gradual smooth boundary.

A3—28 to 41 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium subangular blocky

structure; very friable; common very fine and fine roots; slightly acid; gradual smooth boundary.

A4—41 to 49 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine and medium subangular blocky structure; very friable; common very fine and fine roots; neutral; gradual smooth boundary.

Bw1—49 to 60 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak fine and medium subangular blocky structure; very friable; common very fine and fine roots; neutral; gradual smooth boundary.

Bw2—60 to 71 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; common very fine and fine roots; neutral; gradual smooth boundary.

C—71 to 80 inches; dark brown (10YR 3/3) sandy loam; massive; very friable; common very fine and fine roots; neutral.

### *Range in Characteristics*

*Thickness of the mollic epipedon:* 40 to 71 inches

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—fine sandy loam
Reaction—neutral to moderately acid

*Bw horizon:*
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—sandy loam or fine sandy loam
Reaction—neutral or slightly acid

*C horizon:*
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 to 4
Texture—sandy loam
Reaction—neutral or slightly acid

## *Harps Series*

### *Typical Pedon*

Harps loam, 0 to 2 percent slopes, in a cultivated field; 200 feet north and 50 feet west of the southeast corner of sec. 7, T. 97 N., R. 35 W., Lake Township; USGS Dickens, Iowa, topographic quadrangle; lat. 42 degrees 13 minutes 55 seconds N. and long. 95 degrees 01 minute 00 seconds W., NAD 27:

Ap—0 to 7 inches; black (10YR 2/1) loam, gray (10YR 5/1) dry; weak fine granular structure; friable; common very fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

Ak—7 to 18 inches; black (10YR 2/1) loam, gray (10YR 5/1) dry; weak fine and medium granular structure; friable; common very fine roots; violently effervescent; moderately alkaline; gradual wavy boundary.

ABk—18 to 22 inches; very dark gray (2.5Y 3/1) clay loam, gray (10YR 6/1) dry; weak fine and medium granular structure; friable; common very fine roots; about 2 percent gravel; common fine and medium faint dark grayish brown (2.5Y 4/2) and common fine and medium distinct dark gray (5Y 4/1) redoximorphic depletions; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkg1—22 to 41 inches; gray (5Y 5/1) clay loam; weak fine subangular blocky structure; friable; common very fine roots; few black (10YR 2/1) organic coatings in root channels and/or pores; few fine light gray (10YR 7/2) calcium carbonate nodules; about 3 percent gravel; common fine and medium faint olive gray (5Y 5/2) redoximorphic depletions; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkg2—41 to 51 inches; gray (5Y 5/1) clay loam; weak fine and medium subangular blocky structure; friable; common fine and medium very pale brown (10YR 8/2) calcium carbonate nodules and few fine very pale brown (10YR 8/2) calcium carbonate concretions; about 3 percent gravel; common fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine and medium faint olive gray (5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg—51 to 80 inches; gray (5Y 5/1) loam; massive; friable; about 3 percent gravel; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine and medium faint olive gray (5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Thickness of the mollic epipedon:* 12 to 24 inches

*Ap or Ak horizon:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1

Texture—loam
Reaction—moderately alkaline

*ABk horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—3 or 4
Chroma—0 or 1
Texture—loam or clay loam
Reaction—moderately alkaline

*Bkg horizon:*
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—loam or clay loam
Reaction—moderately alkaline

*Cg horizon:*
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—loam or clay loam with thin strata of coarser material
Reaction—moderately alkaline

## Havelock Series

### Typical Pedon

Havelock clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field; 520 feet west and 110 feet south of the northeast corner of sec. 4, T. 96 N., R. 36 W., Sioux Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 10 minutes 07 seconds N. and long. 95 degrees 05 minutes 35 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) clay loam, very dark gray (N 3/0) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; few fine fragments of snail shells; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A1—7 to 16 inches; black (N 2/0) clay loam, very dark gray (N 3/0) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; slightly effervescent; slightly alkaline; gradual smooth boundary.

A2—16 to 26 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; strongly effervescent; moderately alkaline; gradual smooth boundary.

A3—26 to 34 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; moderate medium and fine subangular blocky structure; friable; strongly effervescent; moderately alkaline; gradual smooth boundary.

A4—34 to 46 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; common fine black (N 2/0) manganese concretions; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg1—46 to 58 inches; dark gray (2.5Y 4/1) loam; massive; friable; many fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg2—58 to 68 inches; dark gray (2.5Y 4/1) loam; massive; friable; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Cg3—68 to 80 inches; dark gray (2.5Y 4/1) loam; massive; firm; common distinct black (10YR 2/1) organic coatings; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* 36 inches or more
*Other features:* Some pedons have an AC horizon or a Bg horizon.

*Ap or A horizon:*
Hue—10YR, 5Y, or N
Value—2 to 4
Chroma—0 or 1
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

*Cg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—loam or clay loam; strata of coarser textures in some pedons
Reaction—neutral to moderately alkaline

## Hawick Series

*Taxadjunct features:* The Hawick soil in map unit 541C does not have a mollic epipedon. This soil is classified as a mixed, mesic Typic Udipsamment.

### Typical Pedon

Hawick gravelly loamy sand, 9 to 14 percent slopes, in a cultivated field; 2,600 feet east and 550 feet north of

the southwest corner of sec. 23, T. 96 N., R. 35 W., Freeman Township; USGS Silver Lake, Iowa, topographic quadrangle; lat. 43 degrees 06 minutes 50 seconds N. and long. 94 degrees 56 minutes 37 seconds W., NAD 27:

Ap—0 to 8 inches; very dark brown (10YR 2/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; very friable; common very fine to medium roots; about 22 percent gravel; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bw—8 to 27 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand; very weak fine subangular blocky structure; very friable; common very fine and fine roots; about 19 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—27 to 46 inches; yellowish brown (10YR 5/4) gravelly sand; single grain; loose; common very fine roots; about 20 percent gravel; strongly effervescent; slightly alkaline; gradual wavy boundary.

C2—46 to 80 inches; yellowish brown (10YR 5/4) gravelly sand; single grain; loose; about 20 percent gravel; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 0 to 30 inches
*Thickness of the mollic epipedon:* 7 to 16 inches

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—gravelly loamy sand
Reaction—slightly acid to slightly alkaline

*Bw horizon:*
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture—gravelly loamy sand, gravelly loamy coarse sand, or gravelly coarse sand
Reaction—slightly acid to slightly alkaline

*C horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—gravelly loamy sand, gravelly coarse sand, or gravelly sand
Reaction—slightly alkaline or moderately alkaline

## Klossner Series

### Typical Pedon

Klossner muck, depressional, 0 to 1 percent slopes, in a cultivated field; 1,400 feet north and 2,250 feet west of the southeast corner of sec. 11, T. 97 N., R. 35 W., Lake Township; USGS Ruthven, Iowa, topographic quadrangle; lat. 43 degrees 14 minutes 07 seconds N. and long. 94 degrees 56 minutes 40 seconds W., NAD 27:

Oap—0 to 9 inches; black (N 2/0) muck, black (10YR 2/1) dry; weak medium granular structure; very friable; common very fine to medium roots; neutral; clear smooth boundary.

Oa1—9 to 12 inches; black (5YR 2.5/1) muck, very dark gray (2.5Y 3/1) dry; weak medium granular and weak medium platy structure; very friable; common very fine to medium roots; neutral; clear smooth boundary.

Oa2—12 to 18 inches; black (5YR 2.5/1) muck, very dark gray (2.5Y 3/1) dry; weak medium granular structure; very friable; common very fine and fine roots; noneffervescent; slightly alkaline; clear smooth boundary.

Oa3—18 to 22 inches; black (5YR 2.5/1) muck, very dark gray (2.5Y 3/1) dry; weak fine granular structure; very friable; common very fine and fine roots; noneffervescent; slightly alkaline; clear smooth boundary.

2A1—22 to 31 inches; black (10YR 2/1) mucky silty clay loam; moderate medium subangular blocky and angular blocky structure; friable; common very fine roots; few yellowish red (5YR 4/6) redoximorphic concentrations in pores and root channels; slightly effervescent; slightly alkaline; clear smooth boundary.

2A2—31 to 53 inches; black (5Y 2/1) silty clay loam; some mixing of olive gray (5Y 5/2) in the lower part; moderate medium subangular blocky structure; friable; common very fine roots; strongly effervescent; slightly alkaline; clear smooth boundary.

2Cg1—53 to 70 inches; mixed olive gray (5Y 5/2) and light olive gray (5Y 6/2) silty clay loam; massive; friable; few very fine and fine roots; common fine prominent yellowish red (5YR 4/6) iron oxide coatings in root channels; strongly effervescent; slightly alkaline; clear smooth boundary.

2Cg2—70 to 80 inches; gray (5Y 5/1) silty clay loam; massive; friable; few very fine roots; few fine prominent yellowish red (5YR 4/6) iron oxide

coatings in root channels; common fine white (10YR 8/1) calcium carbonate nodules; common fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Oap and Oa horizons:*
Hue—10YR, 5YR, or N
Value—2, 2.5, or 3
Chroma—0 to 2
Texture—muck
Reaction—moderately acid to slightly alkaline

*2A horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—loam, silt loam, silty clay loam, or clay loam or the mucky analogs of these textures
Reaction—moderately acid to slightly alkaline

*2Cg horizon:*
Hue—10YR, 2.5Y, 5Y, 5GY, or N
Value—2 to 7
Chroma—0 to 2
Texture—loam, clay loam, silt loam, silty clay loam, or sandy loam or the gravelly analogs of these textures
Reaction—slightly acid to moderately alkaline

## Knoke Series

### Typical Pedon

Knoke mucky silty clay loam, depressional, 0 to 1 percent slopes, in a cultivated field; 1,200 feet south and 600 feet east of the northwest corner of sec. 25, T. 102 N., R. 39 W.

Ap—0 to 10 inches; black (10YR 2/1) mucky silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; very friable; few snail-shell fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

A1—10 to 22 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; few snail-shell fragments; strongly effervescent; moderately alkaline; gradual smooth boundary.

A2—22 to 36 inches; black (10YR 2/1) silty clay loam, very dark gray (2.5Y 3/1) dry; weak medium subangular blocky structure; friable; strongly effervescent; moderately alkaline; gradual smooth boundary.

A3—36 to 42 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg1—42 to 65 inches; very dark gray (5Y 3/1) and dark olive gray (5Y 3/2) silty clay loam; massive; friable; common fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg2—65 to 80 inches; dark gray (5Y 4/1) and dark olive gray (5Y 3/2) silty clay loam; massive; friable; few snail-shell fragments; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 24 to 48 inches

*Ap or A horizon:*
Hue—10YR, 2.5Y, or N
Value—2
Chroma—0 or 1
Texture—silty clay loam or mucky silty clay loam
Reaction—slightly alkaline or moderately alkaline

*Bw horizon (if it occurs):*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 to 5
Chroma—0 or 1
Texture—silty clay loam, clay loam, or silty clay
Reaction—slightly alkaline or moderately alkaline

*BCg horizon (if it occurs):*
Hue—2.5Y, 5Y, or N
Value—2 to 5
Chroma—0 or 1
Texture—silty clay loam, clay loam, or silty clay
Reaction—slightly alkaline or moderately alkaline

*Cg horizon:*
Hue—2.5Y, 5Y, or 5G
Value—3 to 6
Chroma—1 or 2
Texture—silty clay loam, silt loam, clay loam, or loam
Reaction—slightly alkaline or moderately alkaline

## Letri Series

### Typical Pedon

Letri clay loam, 0 to 2 percent slopes, in a cultivated field; 390 feet east and 1,500 feet north of the southwest corner of sec. 23, T. 97 N., R. 38 W., Waterford Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 12 minutes 09 seconds N.

and long. 95 degrees 18 minutes 26 seconds W., NAD 27:

Ap—0 to 9 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine and fine roots; many distinct black (N 2/0) organic coatings on faces of peds; noneffervescent; slightly alkaline; abrupt smooth boundary.

A1—9 to 16 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak medium granular structure; friable; common very fine and fine roots; neutral; clear smooth boundary.

A2—16 to 20 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure; friable; common very fine and fine roots; many distinct dark olive gray (5Y 3/2) organic coatings on faces of peds; common fine prominent olive gray (5Y 4/2) redoximorphic depletions; slightly effervescent; slightly alkaline; clear smooth boundary.

Bg—20 to 26 inches; olive gray (5Y 4/2) clay loam; weak fine subangular blocky structure; friable; common distinct dark olive gray (5Y 3/2) and black (10YR 2/1) organic coatings on faces of peds; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Bkg1—26 to 31 inches; olive gray (5Y 5/2) clay loam; weak fine and medium subangular blocky structure; friable; common fine and medium very pale brown (10YR 8/2) calcium carbonate threads; about 8 percent gravel; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bkg2—31 to 41 inches; grayish brown (2.5Y 5/2) clay loam; weak medium subangular blocky structure; firm; common fine and medium very pale brown (10YR 8/3) calcium carbonate threads; about 8 percent gravel; common fine prominent strong brown (7.5YR 5/6) and many fine and medium prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

2C—41 to 80 inches; light olive brown (2.5Y 5/4) clay loam; massive; firm; about 3 percent gravel; many fine and medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 16 to 30 inches
*Thickness of the mollic epipedon:* 14 to 24 inches

*A horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—clay loam
Reaction—slightly acid to slightly alkaline

*Bg or 2Bkg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—clay loam or silty clay loam
Reaction—neutral to moderately alkaline

*2C horizon:*
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## *May City Series*

*Taxadjunct features:* The May City soil in map unit 672C2 does not have a mollic epipedon. This soil is classified as a loamy-skeletal, mixed, superactive, mesic Typic Eutrudept.

### *Typical Pedon*

May City sandy clay loam, 2 to 5 percent slopes, in a cultivated field; 200 feet east and 1,820 feet south of the center of sec. 22, T. 97 N., R. 38 W., Waterford Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 12 minutes 04 seconds N. and long. 95 degrees 19 minutes 06 seconds W., NAD 27:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; about 11 percent gravel (most pebbles less than 1 inch in diameter); about 3 percent fine fragments of shale; moderately acid; abrupt wavy boundary.

Bw1—7 to 12 inches; dark yellowish brown (10YR 4/4) sandy clay loam with streaks and pockets of very dark grayish brown (10YR 3/2); moderate medium and fine subangular blocky structure parting to moderate fine granular; friable; about 9 percent gravel (some pebbles more than 3 inches in diameter); about 2 percent fine fragments of shale; moderately acid; clear wavy boundary.

Bw2—12 to 19 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak fine and medium subangular blocky structure; very friable; about 25

percent gravel; about 2 percent fine fragments of shale; slightly acid; abrupt wavy boundary.

C1—19 to 36 inches; strong brown (7.5YR 4/6) extremely gravelly sandy loam; massive; very friable; about 67 percent gravel and 10 percent cobbles; about 2 percent fine fragments of shale; strongly effervescent; slightly alkaline; abrupt wavy boundary.

C2—36 to 42 inches; strong brown (7.5YR 5/8) extremely gravelly sandy loam; massive; very friable; few white (10YR 8/1) calcium carbonate coatings on rock fragments; about 57 percent gravel, 3 percent cobbles, and 2 percent shale fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

C3—42 to 53 inches; dominantly yellowish red (5YR 5/6) very gravelly sandy loam; about 20 percent red (2.5YR 4/6) very gravelly sandy loam; massive; very friable; about 54 percent gravel, 3 percent cobbles, and 2 percent shale fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

C4—53 to 67 inches; mixed strong brown (7.5YR 4/6) and yellowish red (5YR 5/6) extremely gravelly sandy loam; massive; very friable; few white (10YR 8/1) calcium carbonate coatings on rock fragments; about 63 percent gravel and 2 percent fine fragments of shale; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C5—67 to 80 inches; mixed yellowish red (5YR 4/6) and red (2.5YR 4/6) extremely gravelly sandy loam; massive; very friable; about 60 percent gravel, 15 percent cobbles, and 2 percent fine fragments of shale; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 7 to 14 inches
*Depth to carbonates:* 0 to 28 inches
*Depth to coarse textured material:* 10 to 24 inches
*Other features:* Some pedons have thin layers of silty to very fine sand sediments between the gravel layers.

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—sandy clay loam
Reaction—moderately acid to slightly alkaline

*Bw horizon:*
Hue—10YR, 7.5YR, or 5YR
Value—3 to 5
Chroma—3 to 6
Texture—loam, sandy loam, or sandy clay loam or the gravelly to extremely gravelly analogs of these textures
Reaction—moderately acid to slightly alkaline

*C horizon:*
Hue—10YR, 7.5YR, 5YR, or 2.5YR
Value—4 to 6
Chroma—4 to 8
Texture—the gravelly to extremely gravelly analogs of sandy loam, sandy clay loam, or loam
Reaction—slightly alkaline or moderately alkaline

## McCreath Series

### Typical Pedon

McCreath silty clay loam, 0 to 2 percent slopes, in a cultivated field; 30 feet north and 1,250 feet west of the southeast corner of sec. 18, T. 94 N., R. 38 W., Peterson Township; USGS Peterson, Iowa, topographic quadrangle; lat. 42 degrees 57 minutes 14 seconds N. and long. 95 degrees 15 minutes 16 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; common very fine and fine roots; neutral; clear smooth boundary.

A1—8 to 13 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak medium granular structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

A2—13 to 17 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; friable; common very fine and fine roots; common fine and medium dark grayish brown (10YR 4/2) wormcasts; slightly acid; clear wavy boundary.

AB—17 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; friable; common very fine roots; few distinct very dark brown (10YR 2/2) organic coatings on faces of peds; slightly acid; gradual wavy boundary.

Bg—22 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots; very few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine very dark brown (10YR 2/2) rounded iron-manganese nodules; neutral; gradual wavy boundary.

Bkg—33 to 47 inches; grayish brown (2.5Y 5/2) silt

loam; weak medium subangular blocky structure; friable; common very fine roots; common fine very dark brown (10YR 2/2) rounded iron-manganese nodules; few fine and medium light gray (2.5Y 7/2) calcium carbonate nodules; common fine and medium prominent light olive brown (2.5Y 5/6) and common fine and medium distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; very slightly effervescent; slightly alkaline; gradual wavy boundary.

2C—47 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; few very fine roots; few fine and medium black (10YR 2/1) rounded iron-manganese concretions; common medium and coarse light gray (2.5Y 7/2) calcium carbonate nodules; about 4 percent gravel; many fine and medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; common fine distinct gray (10YR 6/1) redoximorphic depletions; slightly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 16 to 24 inches
*Depth to carbonates:* 24 to 50 inches
*Depth to till:* 40 to 60 inches

*A horizon:*
Hue—10YR or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam
Reaction—moderately acid to neutral

*Bg horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture—silty clay loam
Reaction—slightly acid to slightly alkaline

*Bkg horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam or silt loam
Reaction—slightly alkaline or moderately alkaline

*2C horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Moneta Series

### Typical Pedon

Moneta clay loam, 18 to 25 percent slopes, in a pasture; 2,350 feet north and 400 feet east of the southwest corner of sec. 20, T. 94 N., R. 36 W., Herdland Township; USGS Sioux Rapids, Iowa, topographic quadrangle; lat. 42 degrees 56 minutes 33 seconds N. and long. 95 degrees 07 minutes 51 seconds W., NAD 27:

A—0 to 9 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; friable; common very fine and fine roots between peds; about 2 percent gravel; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—9 to 13 inches; yellowish brown (10YR 5/6) loam; weak fine and medium granular structure; friable; common very fine and fine roots; few prominent very dark brown (10YR 2/2) organic coatings on faces of peds; about 3 percent gravel; about 2 percent fine fragments of shale; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—13 to 23 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots between peds; carbonates disseminated throughout; about 3 percent gravel; about 2 percent fine fragments of shale; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—23 to 42 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots between peds; very few distinct strong brown (7.5YR 5/6) iron oxide coatings on faces of peds and in pores; common fine and medium very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; about 2 percent fine fragments of shale; common fine and medium prominent gray (10YR 5/1) redoximorphic depletions; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—42 to 53 inches; about 50 percent strong brown (7.5YR 5/6) and 50 percent gray (10YR 5/1) loam; moderate fine and medium angular blocky structure; friable; common very fine and fine roots between peds; very few prominent black (10YR 2/1) organic coatings on faces of peds; common fine and medium very pale brown (10YR 8/2) calcium carbonate nodules and calcium carbonate

coatings around stones; common fine and medium red (2.5YR 4/6) masses of iron; about 3 percent gravel; about 2 percent fine fragments of shale; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk4—53 to 60 inches; about 50 percent strong brown (7.5YR 5/6) and 50 percent gray (10YR 5/1) loam; moderate medium and coarse angular blocky structure; friable; common very fine and fine roots between peds; very few prominent black (10YR 2/1) organic coatings on faces of peds; common medium and coarse very pale brown (10YR 8/2) calcium carbonate nodules; common fine and medium red (2.5YR 4/6) masses of iron; about 5 percent gravel; about 3 percent fine fragments of shale; violently effervescent; moderately alkaline; gradual wavy boundary.

BC—60 to 80 inches; about 50 percent strong brown (7.5YR 5/6) and 50 percent gray (10YR 5/1) loam; moderate coarse and very coarse prismatic structure; firm; common very fine and fine roots; common medium and coarse very pale brown (10YR 8/2) calcium carbonate nodules; common fine and medium red (2.5YR 4/6) masses of iron; about 5 percent gravel; about 3 percent fine fragments of shale; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 6 to 12 inches
*Depth to carbonates:* 0 to 10 inches

*A or Ap horizon:*
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

*Bw and Bk horizons:*
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—1 to 8
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

*BC or C horizon:*
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—1 to 8
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Nicollet Series

### Typical Pedon

Nicollet loam, 1 to 3 percent slopes, in a cultivated field; 210 feet north and 540 feet east of the center of sec. 26, T. 94 N., R. 35 W., Herdland Township; USGS Webb, Iowa, topographic quadrangle; lat. 42 degrees 55 minutes 57 seconds N. and long. 95 degrees 03 minutes 40 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common fine roots; about 2 percent gravel; slightly acid; abrupt smooth boundary.

AB—8 to 16 inches; black (10YR 2/1) loam; some mixing of very dark grayish brown (10YR 3/2) in the lower part; dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; about 2 percent gravel; slightly acid; gradual smooth boundary.

Bg1—16 to 22 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; about 2 percent gravel; neutral; clear smooth boundary.

Bg2—22 to 31 inches; dark grayish brown (2.5Y 4/2) loam; weak fine subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 3 percent gravel; few fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

Bkg—31 to 43 inches; grayish brown (2.5Y 5/2) loam; weak fine and medium subangular blocky structure; friable; few fine white (10YR 8/1) calcium carbonate nodules; about 3 percent gravel; many fine distinct light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

Cg1—43 to 55 inches; grayish brown (2.5Y 5/2) loam; massive; friable; few fine white (10YR 8/1) calcium carbonate nodules; about 3 percent gravel; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cg2—55 to 80 inches; grayish brown (2.5Y 5/2) loam; massive; friable; common fine white (10YR 8/1)

calcium carbonate nodules; about 5 percent gravel; many medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 20 to 48 inches
*Thickness of the mollic epipedon:* 10 to 24 inches

*Ap and AB horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—moderately acid to neutral

*Bg and Bkg horizons:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly acid to slightly alkaline

*Cg horizon:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2 to 4
Texture—loam
Reaction—slightly alkaline or moderately alkaline

## Ocheda Series

### Typical Pedon

Ocheda silty clay loam, 1 to 3 percent slopes, in a cultivated field; about 75 feet south and 138 feet east of the northwest corner of sec. 25, T. 97 N., R. 35 W.; USGS Ruthven, Iowa, topographic quadrangle; lat. 43 degrees 14 minutes 38 seconds N. and long. 94 degrees 56 minutes 06 seconds W., NAD 27:

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; firm; common very fine and fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

A—6 to 12 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate very fine subangular blocky structure; firm; few very fine and fine roots; few very fine tubular pores; slightly acid; clear smooth boundary.

AB—12 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine and fine subangular blocky structure; firm; few very fine and fine roots; few very fine tubular pores; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear wavy boundary.

Bg1—19 to 27 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate very fine and fine subangular blocky structure; firm; few very fine and fine roots; few very fine tubular pores; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine distinct olive brown (2.5Y 4/4) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Bg2—27 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate very fine prismatic structure parting to moderate fine subangular blocky; firm; few very fine and fine roots; few very fine tubular pores; common distinct dark grayish brown (2.5Y 4/2) organic coatings on faces of peds; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly acid; clear wavy boundary.

Bkg—38 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; weak fine prismatic structure parting to weak medium subangular blocky; friable; few very fine and fine roots; few very fine tubular pores; common fine rounded very pale brown (10YR 8/2) masses and concretions of calcium carbonate; about 5 percent mixed gravel; common medium and coarse prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

2Cg—50 to 80 inches; light olive brown (2.5Y 5/4) and grayish brown (2.5Y 5/2) loam; massive; friable; very few fine tubular pores; common very fine and fine very pale brown (10YR 8/2) masses of calcium carbonate; about 2 percent mixed gravel; common fine and medium distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 12 to 24 inches
*Depth to free carbonates:* 18 to 44 inches
*Depth to till:* 40 to 60 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or silty clay
Reaction—moderately acid to neutral

*Bw or Bg horizon:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 or 3

Texture—silty clay loam, silty clay, or clay
Reaction—moderately acid to neutral

*Bk or Bkg horizon:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 or 3
Texture—silty clay loam or silty clay
Reaction—slightly alkaline or moderately alkaline

*2Cg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

## Ocheyedan Series

*Taxadjunct features:* The Ocheyedan soil in map unit 379C2 does not have a mollic epipedon. This soil is classified as a fine-loamy, mixed, superactive, mesic Typic Eutrudept.

### Typical Pedon

Ocheyedan loam, 2 to 5 percent slopes, in a cultivated field; 960 feet north and 710 feet east of the southwest corner of sec. 28, T. 97 N., R. 38 W.; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 11 minutes 12 seconds N. and long. 95 degrees 20 minutes 42 seconds W., NAD 27:

Ap—0 to 7 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; slightly acid; clear smooth boundary.
A—7 to 14 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; few brown (10YR 4/3) earthworm casts; slightly acid; gradual smooth boundary.
Bw1—14 to 21 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; few black (10YR 2/1) earthworm casts; neutral; gradual smooth boundary.
Bw2—21 to 26 inches; brown (10YR 4/3) sandy clay loam; weak fine subangular blocky structure; friable; few black (10YR 2/1) earthworm casts; neutral; gradual smooth boundary.
Bw3—26 to 34 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; many pores about $^{1}/_{16}$ inch in diameter; neutral; gradual smooth boundary.
2BC—34 to 44 inches; mixed dark yellowish brown (10YR 4/4) and grayish brown (2.5Y 5/2) silt loam; weak medium subangular blocky structure; friable; common fine distinct light olive brown (2.5Y 5/6) redoximorphic concentrations; noneffervescent; slightly alkaline; gradual smooth boundary.
2Cg—44 to 65 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; common fine and medium very pale brown (10YR 8/2) masses of calcium carbonate; common medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; abrupt smooth boundary.
3C—65 to 80 inches; yellowish brown (10YR 5/4 and 5/6) clay loam; massive; firm; common fine and medium very pale brown (10YR 8/2) masses of calcium carbonate; about 3 percent gravel; common medium distinct grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 20 to 55 inches
*Thickness of the mollic epipedon:* 12 to 20 inches
*Other features:* A lacustrine substratum phase is recognized. The lacustrine material is below a depth of 60 inches. It has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 to 4. The texture is silt loam, silty clay loam, silty clay, or clay. Reaction is slightly alkaline or moderately alkaline.

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—moderately acid to neutral

*Bw horizon:*
Hue—10YR
Value—4
Chroma—3 or 4
Texture—loam, fine sandy loam, or sandy clay loam
Reaction—slightly acid or neutral

*2BC and 2Cg horizons:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 6
Texture—sandy loam, silt loam, or sandy clay loam
Reaction—slightly alkaline or moderately alkaline

*3C horizon:*
Hue—10YR or 2.5Y
Value—4 to 6

Chroma—2 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Okoboji Series

### Typical Pedon

Okoboji silty clay loam, depressional, 0 to 1 percent slopes, in a cultivated field; 2,500 feet south and 550 feet west of the northeast corner of sec. 12, T. 97 N., R. 35 W., Lake Township; USGS Ruthven, Iowa, topographic quadrangle; lat. 43 degrees 14 minutes 06 seconds N. and long. 94 degrees 54 minutes 57 seconds W., NAD 27:

Ap—0 to 8 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; weak fine granular structure; friable; common very fine and fine roots; slightly alkaline; clear smooth boundary.

A1—8 to 18 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; moderate fine and medium granular structure; friable; common very fine and fine roots; slightly alkaline; clear smooth boundary.

A2—18 to 40 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure; friable; common very fine roots; neutral; clear smooth boundary.

AB—40 to 45 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; common very fine roots; very few reddish brown (5YR 4/4) iron oxide coatings on faces of peds; common medium prominent olive gray (5Y 5/2) redoximorphic depletions; neutral; gradual wavy boundary.

Bg1—45 to 55 inches; dark gray (5Y 4/1) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots; very few distinct black (10YR 2/1) organic coatings on faces of peds; few medium black (10YR 2/1) rounded iron-manganese concretions; common medium faint olive gray (5Y 5/2) redoximorphic depletions; neutral; gradual wavy boundary.

Bg2—55 to 65 inches; olive gray (5Y 5/2) silty clay loam; weak fine subangular blocky structure; friable; very few distinct black (10YR 2/1) organic coatings on faces of peds; few yellowish red (5YR 4/6) iron oxide coatings on faces of peds; few medium black (10YR 2/1) rounded iron-manganese concretions; common medium faint gray (5Y 5/1) redoximorphic depletions; slightly alkaline; clear smooth boundary.

Cg—65 to 80 inches; olive gray (5Y 5/2) silty clay loam; massive; friable; few yellowish red (5YR 4/6) iron oxides; few medium black (10YR 2/1) rounded iron-manganese concretions; common medium faint gray (5Y 5/1) redoximorphic depletions; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 20 to 56 inches
*Thickness of the mollic epipedon:* 24 to 48 inches

*Ap, A, and AB horizons:*
Hue—10YR, 5Y, or N
Value—2
Chroma—0 or 1
Texture—silty clay loam or mucky silty clay loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 5
Chroma—0 to 2
Texture—silty clay loam or silty clay
Reaction—neutral or slightly alkaline

*Cg horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam that has thin strata of silt loam
Reaction—slightly alkaline or moderately alkaline

## Omsrud Series

*Taxadjunct features:* The Omsrud soils in this survey area do not have a mollic epipedon. They are classified as fine-loamy, mixed, superactive, mesic Typic Eutrudepts.

### Typical Pedon

Omsrud loam, in an area of Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field; 780 feet south and 300 feet west of the northeast corner of sec. 3, T. 96 N., R. 36 W., Sioux Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 09 minutes 53 seconds N. and long. 97 degrees 04 minutes 56 seconds W., NAD 27:

Ap—0 to 9 inches; dark brown (10YR 2/2) loam; mixed with streaks and pockets of dark yellowish brown (10YR 4/4) material from the subsoil; very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; common very fine and fine roots; about 2 percent gravel; neutral; abrupt smooth boundary.

Bw1—9 to 20 inches; dark yellowish brown (10YR 4/4)

loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; about 3 percent gravel; neutral; clear smooth boundary.

Bw2—20 to 32 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure; friable; common very fine and fine roots; about 2 percent gravel; neutral; abrupt wavy boundary.

Bk—32 to 45 inches; yellowish brown (10YR 5/4) loam; weak very fine prismatic structure parting to weak medium subangular blocky; friable; common very fine and fine roots; few very fine black (10YR 2/1) iron-manganese oxide coatings on faces of prisms; few fine prominent yellowish red (5YR 4/6) iron concretions; common white (10YR 8/1) masses of calcium carbonate; about 3 to 5 percent gravel; slightly effervescent; moderately alkaline; clear smooth boundary.

C1—45 to 63 inches; yellowish brown (10YR 5/4) loam; massive; friable; few fine black (10YR 2/1) iron-manganese oxide coatings on faces of joints; few fine prominent red (2.5YR 4/6) iron concretions; common white (10YR 8/1) masses of calcium carbonate; about 3 to 5 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—63 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; few fine black (10YR 2/1) iron-manganese oxide coatings on faces of joints; common very pale brown (10YR 8/2) threads and masses of calcium carbonate; about 5 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 18 to 50 inches
*Thickness of the mollic epipedon:* 7 to 20 inches

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—moderately acid to neutral

*Bw and Bk horizons:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—loam
Reaction—moderately acid to neutral in the Bw horizon; slightly alkaline or moderately alkaline in the Bk horizon

*C horizon:*
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—loam or sandy loam
Reaction—slightly alkaline or moderately alkaline

## Primghar Series

### Typical Pedon

Primghar silty clay loam, 0 to 2 percent slopes, in a cultivated field; about 4 1/2 miles north and 2 miles west of Marcus, in Cherokee County, Iowa; about 880 feet south and 410 feet west of the northeast corner of sec. 7, T. 93 N., R. 42 W.; USGS Granville East topographic quadrangle; lat. 42 degrees 53 minutes 35 seconds N. and long. 95 degrees 50 minutes 34 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; moderately acid; clear smooth boundary.

A—8 to 12 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; neutral; gradual smooth boundary.

AB—12 to 17 inches; very dark grayish brown (10YR 3/2) silty clay loam; some mixing of very dark grayish brown (2.5Y 3/2) subsoil material in the lower part; grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; black (10YR 2/1) coatings on faces of peds; neutral; gradual smooth boundary.

Bw1—17 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak fine subangular blocky structure; friable; few black (10YR 2/1) concretions (manganese oxides); common very dark grayish brown (10YR 3/2) coatings in root channels and on faces of peds; few fine distinct olive brown (2.5Y 4/4) and few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

Bw2—25 to 36 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak fine subangular blocky structure; friable; common black (10YR 2/1) concretions (manganese oxides); few fine distinct olive brown (2.5Y 4/4) and few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly alkaline; gradual smooth boundary.

Bkg—36 to 49 inches; dark grayish brown (2.5Y 5/2) silt loam; weak coarse subangular blocky structure; friable; common black (10YR 2/1) concretions (manganese oxides); common very pale brown (10YR 8/2) calcium carbonate nodules; many medium distinct light olive brown

(2.5Y 5/4) and common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cg—49 to 60 inches; mottled grayish brown (2.5Y 5/2) silt loam; massive; friable; many strong brown (7.5YR 5/6) redoximorphic concentrations; many black (10YR 2/1) concretions (manganese oxides); common very pale brown (10YR 8/2) calcium carbonate accumulations and few very pale brown (10YR 8/2) calcium carbonate nodules; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 24 to 48 inches
*Thickness of the mollic epipedon:* 14 to 24 inches
*Depth to till:* More than 60 inches
*Other features:* Some pedons have a 2C or 2Cg horizon below a depth of 60 inches.

*Ap, A, and AB horizons:*
Hue—10YR, 2.5Y, or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam
Reaction—moderately acid to neutral

*Bw horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline

*Bk or Bkg horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

*C or Cg horizon (if it occurs):*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

*2C or 2Cg horizon (if it occurs):*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline
Content of rock fragments—1 to 8 percent by volume

## Ransom Series

### Typical Pedon

Ransom silty clay loam, 1 to 3 percent slopes, in a cultivated field; 1,000 feet north and 1,200 feet west of the southeast corner of sec. 19, T. 94 N., R. 36 W., Herdland Township; USGS Sioux Rapids topographic quadrangle; lat. 42 degrees 56 minutes 33 seconds N. and long. 95 degrees 08 minutes 12 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium angular blocky structure parting to weak fine granular; friable; common very fine and fine roots; neutral; clear smooth boundary.

A—8 to 13 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common very fine and fine roots; slightly acid; gradual smooth boundary.

BA—13 to 17 inches; dark brown (10YR 3/3) and brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure parting to weak fine granular; friable; common very fine and fine roots; slightly acid; gradual smooth boundary.

Bw1—17 to 22 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; few distinct dark brown (10YR 3/3) coatings on faces of peds; slightly acid; gradual wavy boundary.

Bw2—22 to 34 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; few fine black (10YR 2/1) rounded iron-manganese nodules; few fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; common medium and coarse distinct dark grayish brown (2.5Y 4/2) redoximorphic depletions; neutral; clear smooth boundary.

2BC1—34 to 36 inches; dark grayish brown (2.5Y 4/2) loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; few fine black (10YR 2/1) rounded iron-manganese nodules; about 2 percent gravel; common fine prominent strong brown (7.5YR 4/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

2BC2—36 to 80 inches; yellowish brown (10YR 5/4) loam; weak coarse prismatic structure; firm; common very fine and fine roots; common

medium and coarse very pale brown (10YR 8/2) calcium carbonate nodules; about 2 percent gravel; common fine and medium prominent strong brown (7.5YR 4/6) and yellowish red (5YR 4/6) redoximorphic concentrations; many fine and medium prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 22 to 40 inches
*Thickness of the mollic epipedon:* 14 to 22 inches
*Depth to till:* 24 to 40 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Reaction—neutral or slightly acid

*BA and Bw horizons:*
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 to 4
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline

*2BC horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 5
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Ridgeport Series

### Typical Pedon

Ridgeport sandy loam, 0 to 2 percent slopes, 100 feet west and 600 feet south of the northeast corner of sec. 31, T. 91 N., R. 28 W.; in Humboldt County, Iowa; USGS Humboldt topographic quadrangle; lat. 42 degrees 11 minutes 18 seconds N. and long. 94 degrees 16 minutes 58 seconds W., NAD 27:

Ap—0 to 8 inches; very dark brown (10YR 2/2) sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; very friable; common fine roots; about 3 percent gravel; neutral; abrupt smooth boundary.

A—8 to 15 inches; very dark brown (10YR 2/2) sandy loam, very dark brown (10YR 2/2) dry; weak fine and medium granular structure; very friable; common fine roots; about 3 percent gravel; neutral; clear smooth boundary.

BA—15 to 19 inches; very dark grayish brown (10YR 3/2) sandy loam; weak fine subangular blocky structure parting to weak fine granular; very friable; common fine roots; few faint dark brown (10YR 3/3) organic coatings on faces of peds; about 5 percent gravel; neutral; gradual smooth boundary.

Bw1—19 to 25 inches; brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; about 5 percent gravel; neutral; gradual smooth boundary.

Bw2—25 to 36 inches; brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; about 7 percent gravel; neutral; gradual smooth boundary.

2BC—36 to 46 inches; brown (7.5YR 4/4) and strong brown (7.5YR 4/6) loamy sand; weak fine and medium subangular blocky structure; very friable; about 10 percent gravel; neutral; abrupt smooth boundary.

2C1—46 to 58 inches; brown (10YR 5/3) gravelly sand; single grain; loose; about 20 to 25 percent gravel; slightly effervescent; slightly alkaline; gradual smooth boundary.

2C2—58 to 80 inches; brown (10YR 5/3) gravelly sand; single grain; loose; about 20 to 25 percent gravel; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 24 to 50 inches
*Thickness of the mollic epipedon:* 10 to 24 inches
*Depth to contrasting material:* 24 to 40 inches

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—2
Texture—sandy loam
Reaction—neutral or slightly acid

*Bw horizon:*
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 or 4
Texture—sandy loam
Reaction—neutral or slightly acid

*2BC horizon:*
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 to 6
Texture—loamy sand
Reaction—neutral or slightly alkaline

*2C horizon:*
Hue—10YR

Value—4 or 5
Chroma—3 or 4
Texture—gravelly sand
Reaction—slightly alkaline or moderately alkaline

## Roine Series

*Taxadjunct features:* The Roine soil in map unit 875C2 does not have a mollic epipedon. This soil is classified as a loamy-skeletal, mixed, mesic Typic Eutrudept.

### Typical Pedon

Roine fine sandy loam, 0 to 2 percent slopes, in a cultivated field; 2,440 feet north and 100 feet west of the southeast corner of sec. 14, T. 96 N., R. 38 W., Lone Tree Township; USGS Everly, Iowa, topographic quadrangle; lat. 43 degrees 08 minutes 03 seconds N. and long. 95 degrees 16 minutes 45 seconds W., NAD 27:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common very fine to medium roots; slightly acid; abrupt smooth boundary.

A—8 to 12 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; common very fine to medium roots; moderately acid; clear smooth boundary.

Bw1—12 to 22 inches; brown (7.5YR 4/4) fine sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; slightly acid; gradual smooth boundary.

Bw2—22 to 38 inches; brown (7.5YR 4/4) loamy fine sand; weak fine and medium subangular blocky structure; very friable; common fine and medium roots; slightly acid; gradual smooth boundary.

Bw3—38 to 48 inches; brown (7.5YR 4/4 and 5/4), stratified loamy fine sand and sandy loam; weak fine and medium subangular blocky structure; very friable; common fine and medium roots; few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; common fine prominent grayish brown (10YR 5/2) redoximorphic depletions; neutral; gradual smooth boundary.

2Cg1—48 to 52 inches; grayish brown (10YR 5/2) loam; massive; friable; common fine roots; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

2Cg2—52 to 59 inches; grayish brown (10YR 5/2) silt loam; massive; friable; common fine roots; many medium and coarse rounded yellowish red (5YR 4/6) masses of iron; few medium rounded very dark grayish brown (10YR 3/2) iron-manganese nodules; many fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

3Cg3—59 to 76 inches; grayish brown (10YR 5/2) clay loam; massive; firm; common fine and medium rounded yellowish red (5YR 4/6) masses of iron; few fine rounded very pale brown (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; many fine and medium prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

3Cg4—76 to 80 inches; grayish brown (2.5Y 5/2) clay loam; massive; firm; common fine and medium rounded strong brown (7.5YR 4/6) masses of iron; few medium very dark gray (10YR 3/1) iron-manganese nodules; about 3 percent gravel; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 40 to 80 inches
*Thickness of the mollic epipedon:* 10 to 16 inches
*Depth to till:* 40 to 60 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—fine sandy loam, loam, or sandy loam
Reaction—moderately acid to neutral

*Bw horizon:*
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Texture—sandy loam, fine sandy loam, or loamy fine sand
Reaction—moderately acid to neutral

*2Cg horizon:*
Hue—2.5Y, 5Y, or 10YR
Value—4 to 6
Chroma—2 to 4
Texture—silt loam or loam
Reaction—slightly alkaline or moderately alkaline

*3Cg horizon:*
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Rolfe Series

### Typical Pedon

Rolfe silt loam, depressional, 0 to 1 percent slopes, in a cultivated field; 110 feet east and 1,056 feet south of the center of sec. 3, T. 96 N., R. 35 W., Freeman Township; USGS Ruthven, Iowa, topographic quadrangle; lat. 43 degrees 09 minutes 34 seconds N. and long. 95 degrees 57 minutes 44 seconds W., NAD 27:

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

E—10 to 16 inches; gray (2.5Y 5/1) silt loam, light gray (10YR 7/1) dry; weak thin platy structure parting to weak fine granular; friable; common medium prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly acid; abrupt smooth boundary.

Btg1—16 to 21 inches; very dark gray (5Y 3/1) silty clay; strong medium and fine angular blocky structure; firm; distinct very dark gray (5Y 3/1) clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

Btg2—21 to 32 inches; olive gray (5Y 4/2) silty clay; moderate fine prismatic structure parting to moderate fine angular blocky; firm; distinct very dark gray (5Y 3/1) clay films on faces of peds and prisms; common fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; moderately acid; gradual smooth boundary.

Btg3—32 to 41 inches; olive gray (5Y 5/2) silty clay; moderate fine prismatic structure parting to moderate medium angular blocky; firm; distinct very dark gray (5Y 3/1) clay films on faces of peds and prisms; few coarse prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; moderately acid; clear smooth boundary.

Btg4—41 to 50 inches; olive gray (5Y 5/2) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; distinct very dark gray (5Y 3/1) clay films on faces of peds and prisms; common medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; moderately acid; abrupt wavy boundary.

2BCg—50 to 62 inches; olive gray (5Y 5/2) clay loam; weak medium prismatic structure; friable; about 2 percent gravel; many moderate prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

2Cg—62 to 80 inches; olive gray (5Y 5/2) clay loam; massive; friable; about 2 percent gravel; common medium and fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 42 to 80 inches
*Thickness of the mollic epipedon:* 10 to 20 inches

*Ap horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Reaction—strongly acid to neutral

*E horizon:*
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—1 or 2
Texture—silt loam or loam
Reaction—strongly acid to slightly acid

*Btg horizon:*
Hue—5Y or 2.5Y
Value—3 to 6
Chroma—1 or 2
Texture—silty clay, clay, or clay loam
Reaction—moderately acid to neutral

*2BCg and 2Cg horizons:*
Hue—5Y or 2.5Y
Value—4 to 6
Chroma—1 to 3
Texture—clay loam or loam
Reaction—slightly alkaline

## Rushmore Series

### Typical Pedon

Rushmore silty clay loam, 0 to 2 percent slopes, in a cultivated field; 1,300 feet west and 1,000 feet north of the southeast corner of sec. 2, T. 97 N., R. 37 W., Summit Township; USGS Spencer, Iowa, topographic quadrangle; lat. 43 degrees 14 minutes 43 seconds N.

and long. 95 degrees 10 minutes 28 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; weak fine granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

A1—7 to 15 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; weak medium granular structure; friable; common very fine and fine roots; neutral; gradual smooth boundary.

A2—15 to 21 inches; very dark gray (N 3/0) silty clay loam, dark gray (5Y 4/1) dry; weak very fine subangular blocky structure; friable; common very fine and fine roots; common fine prominent very dark grayish brown (2.5Y 3/2) redoximorphic depletions; slightly alkaline; clear smooth boundary.

Bg1—21 to 30 inches; olive gray (5Y 4/2) silty clay loam; weak fine subangular blocky structure; friable; common very fine and fine roots; few distinct very dark gray (5Y 3/1) organic coatings on faces of peds; common fine and medium prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly alkaline; gradual smooth boundary.

2Bg2—30 to 42 inches; olive gray (5Y 4/2) clay loam; weak fine and medium subangular blocky structure; firm; common very fine and fine roots; about 2 percent gravel; common fine and medium prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2BCg—42 to 52 inches; grayish brown (2.5Y 5/2) loam; weak very fine prismatic structure; firm; about 2 percent gravel; about 2 percent fine fragments of shale; common fine prominent yellowish brown (10YR 5/6) and many fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual smooth boundary.

2Cg—52 to 80 inches; grayish brown (2.5Y 5/2) loam; massive; firm; about 2 percent gravel; about 2 percent fine fragments of shale; many fine prominent yellowish brown (10YR 5/6) and common fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Depth to carbonates:* 15 to 36 inches
*Thickness of the mollic epipedon:* 14 to 24 inches
*Depth to till:* 24 to 40 inches

*Ap and A horizons:*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—neutral or slightly alkaline

*2Bg and 2BCg horizons:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

*2Cg horizon:*
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Sac Series

*Taxadjunct features:* The Sac soil in map unit 77C2 does not have a mollic epipedon. This soil is classified as a fine-loamy, mixed, superactive, mesic Typic Eutrudept.

### Typical Pedon

Sac silty clay loam, 2 to 5 percent slopes, in a cultivated field; 1,700 feet north and 400 feet west of the southeast corner of sec. 16, T. 95 N., R. 38 W., Clay Township; USGS Royal, Iowa, topographic quadrangle; lat. 43 degrees 02 minutes 39 seconds N. and long. 95 degrees 19 minutes 45 seconds W., NAD 27:

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; common very fine and fine pores; slightly acid; clear smooth boundary.

A—6 to 12 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; friable; common very fine and fine roots; common very fine and fine pores; slightly acid; gradual smooth boundary.

AB—12 to 16 inches; dark brown (10YR 3/3) silty clay

loam, brown (10YR 4/3) dry; weak fine subangular blocky structure parting to weak medium granular; friable; common very fine and fine roots; common very fine and fine pores; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

Bw1—16 to 24 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots; common very fine and fine pores; very few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bw2—24 to 32 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; common very fine and fine pores; common fine and medium distinct dark yellowish brown (10YR 4/6) redoximorphic concentrations; neutral; abrupt wavy boundary.

2Bw3—32 to 38 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common very fine and fine pores; few faint brown (10YR 4/3) coatings; about 3 percent rounded cobbles; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline; abrupt wavy boundary.

2Bk1—38 to 46 inches; yellowish brown (10YR 5/4) clay loam; weak fine prismatic structure; firm; common very fine and fine pores; common fine and medium very pale brown (10YR 8/2) carbonate masses; about 2 percent rounded mixed cobbles and about 2 percent angular shale pebbles; common fine distinct grayish brown (10YR 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bk2—46 to 55 inches; yellowish brown (10YR 5/6) clay loam; weak fine prismatic structure; firm; common very fine and fine pores; few prominent yellowish red (5YR 4/6) iron stains; common fine and medium very pale brown (10YR 8/2) carbonate masses; about 2 percent rounded mixed cobbles and 3 percent rounded mixed pebbles; common fine distinct yellowish brown (10YR 5/8) redoximorphic concentrations; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; clear wavy boundary.

2C1—55 to 70 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; common very fine and fine pores; few fine and medium very pale brown (10YR 8/2) carbonate masses; about 2 percent rounded mixed cobbles, 2 percent rounded mixed gravel, and 3 percent angular shale fragments; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline; gradual smooth boundary.

2C2—70 to 80 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; common very fine and fine pores; few fine and medium very pale brown (10YR 8/2) carbonate nodules; about 2 percent rounded mixed cobbles and 2 percent rounded mixed pebbles; common fine and medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; many fine and medium prominent grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 20 to 40 inches
*Thickness of the mollic epipedon:* 10 to 20 inches
*Depth to till:* 20 to 40 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Reaction—moderately acid or slightly acid

*AB or BA horizon:*
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silty clay loam
Reaction—moderately acid or slightly acid

*Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral

*2Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—loam or clay loam
Reaction—slightly acid to slightly alkaline

*2Bk horizon:*
Hue—10YR
Value—4 or 5

Chroma—3 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

*2C horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## Shandep Series

### Typical Pedon

Shandep loam, 0 to 2 percent slopes, in a pasture; about 8 miles east of Hampton, in Franklin County, Iowa; 1,675 feet south and 75 feet east of the northwest corner of sec. 36, T. 92 N., R. 19 W.; USGS Ackley Northeast topographic quadrangle; lat. 42 degrees 44 minutes 24 seconds N. and long. 93 degrees 02 minutes 41 seconds W., NAD 27:

A1—0 to 5 inches; black (N 2/0) loam; moderate fine granular structure; friable; few pebbles; slightly acid; gradual smooth boundary.
A2—5 to 25 inches; black (N 2/0) clay loam; moderate fine granular structure; friable; few pebbles; slightly acid; gradual smooth boundary.
A3—25 to 29 inches; black (5Y 2/1) and very dark gray (5Y 3/1) clay loam; weak medium granular structure; friable; few pebbles; slightly acid; clear wavy boundary.
Bg1—29 to 37 inches; dark gray (5Y 4/1) clay loam; weak fine and medium subangular blocky structure; friable; few pebbles; slightly acid; gradual wavy boundary.
Bg2—37 to 45 inches; gray (5Y 5/1) loam; weak fine and medium subangular blocky structure; friable; few pebbles; slightly acid; clear wavy boundary.
2Cg—45 to 60 inches; dark gray (5Y 4/1) loamy sand; single grain; loose; few pebbles; slightly acid.

### Range in Characteristics

*Thickness of the mollic epipedon:* 26 to 36 inches
*Depth to sandy material:* 40 to 60 inches

*A or Ap horizon:*
Hue—5Y or N
Value—2 or 3
Chroma—0 or 1
Texture—clay loam or loam
Reaction—slightly acid to slightly alkaline

*Bg horizon:*
Hue—5Y or N
Value—4 or 5
Chroma—0 or 1
Texture—clay loam, loam, or silty clay loam
Reaction—slightly acid to slightly alkaline

*2Cg horizon:*
Hue—5Y
Value—4 or 5
Chroma—1
Texture—loamy sand or gravelly loamy sand
Reaction—slightly acid to moderately alkaline

## Sparta Series

### Typical Pedon

Sparta loamy sand, 5 to 9 percent slopes, in a cultivated field; 644 feet north and 2,277 feet west of the southeast corner of sec. 29, T. 97 N., R. 37 W., Summit Township; USGS Spencer, Iowa, topographic quadrangle; lat. 43 degrees 11 minutes 07 seconds N. and long. 95 degrees 13 minutes 47 seconds W., NAD 27:

Ap—0 to 8 inches; very dark brown (10YR 2/2) loamy sand, dark grayish brown (10YR 4/2) dry; weak fine and medium granular structure; very friable; few fine and medium roots; slightly acid; abrupt smooth boundary.
A—8 to 13 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; very friable; very fine and fine roots; very dark brown (10YR 2/2) organic coatings in the upper 2 inches; slightly acid; gradual smooth boundary.
Bw—13 to 25 inches; dark yellowish brown (10YR 4/4) loamy sand; some mixing of dark brown (10YR 3/3) loamy sand in the upper part; weak coarse subangular blocky structure; very friable; neutral; abrupt wavy boundary.
C1—25 to 36 inches; dark yellowish brown (10YR 4/4) sand; single grain; loose; neutral; gradual smooth boundary.
C2—36 to 48 inches; yellowish brown (10YR 5/4) sand; single grain; loose; neutral; gradual smooth boundary.
C3—48 to 60 inches; brownish yellow (10YR 6/6) sand; single grain; loose; neutral; gradual smooth boundary.
C4—60 to 80 inches; brownish yellow (10YR 6/6) sand; single grain; loose; slightly alkaline.

### *Range in Characteristics*

*Thickness of the mollic epipedon:* 10 to 24 inches

*Ap and A horizons:*
Hue—10YR or 7.5YR
Value—2 or 3
Chroma—1 or 2
Texture—loamy sand
Reaction—strongly acid to neutral

*Bw horizon:*
Hue—10YR or 7.5YR
Value—3 to 6
Chroma—3 to 6
Texture—loamy sand, sand, or fine sand
Reaction—strongly acid to neutral

*C horizon:*
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—sand or fine sand
Reaction—strongly acid to slightly alkaline

## *Spillville Series*

### *Typical Pedon*

Spillville loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field; 333 feet north and 204 feet east of the center of sec. 12, T. 94 N., R. 37 W., Douglas Township; USGS Sioux Rapids, Iowa, topographic quadrangle; lat. 42 degrees 58 minutes 34 seconds N. and long. 95 degrees 09 minutes 36 seconds W., NAD 27:

Ap—0 to 7 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; neutral; abrupt smooth boundary.

A1—7 to 17 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; neutral; gradual smooth boundary.

A2—17 to 32 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; neutral; gradual smooth boundary.

A3—32 to 41 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; neutral; abrupt wavy boundary.

A4—41 to 52 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable; thin white (10YR 8/1) calcium carbonate coatings on faces of peds and prisms; slightly effervescent; slightly alkaline; gradual smooth boundary.

AC—52 to 58 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable; very dark gray (10YR 3/1) coatings on faces of peds and prisms; white (10YR 8/1) calcium carbonate coatings on faces of peds and prisms; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

C1—58 to 67 inches; dark grayish brown (10YR 4/2) loam; massive; friable; few thin strata of grayish brown (10YR 5/2); common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual wavy boundary.

C2—67 to 80 inches; dark grayish brown (10YR 4/2), stratified loam and sandy loam; massive (single grain in the coarser strata); friable (loose in the coarser strata); few thin strata of pale brown (10YR 6/3); about 3 to 5 percent gravel; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* More than 40 inches

*A and AC horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—moderately acid to slightly alkaline

*C horizon:*
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 or 2
Texture—loam grading to stratified loamy sand
Reaction—neutral to moderately alkaline

## *Storden Series*

### *Typical Pedon*

Storden loam, in an area of Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded, in a cultivated field; 950 feet south and 2,150 feet west of the northeast corner of sec. 7, T. 97 N., R. 35 W., Lake

Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 14 minutes 21 seconds N. and long. 95 degrees 01 minute 20 seconds W., NAD 27:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine and medium roots; about 5 percent gravel; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Bk—7 to 16 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common medium rounded strong brown (7.5YR 5/6) iron concretions; few fine light gray (10YR 7/2) calcium carbonate threads; about 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—16 to 55 inches; yellowish brown (10YR 5/4) loam; massive; friable; common very fine and fine roots; common medium rounded strong brown (7.5YR 5/6) iron concretions; few fine light gray (10YR 7/2) calcium carbonate threads; about 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—55 to 80 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable; common very fine and fine roots; common medium rounded strong brown (7.5YR 5/6) iron concretions; few fine light gray (10YR 7/2) calcium carbonate threads; about 5 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Presence of carbonates:* In all horizons

*A or Ap horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 3
Texture—loam
Reaction—slightly alkaline or moderately alkaline

*Bk horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 to 6
Texture—loam
Reaction—slightly alkaline or moderately alkaline

*C horizon:*
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 6
Texture—sandy loam or loam
Reaction—slightly alkaline or moderately alkaline

## Sunburg Series

### Typical Pedon

Sunburg loam, 9 to 14 percent slopes, moderately eroded, in a cultivated field; 2,400 feet south and 150 feet west of the northeast corner of sec. 20, T. 97 N., R. 35 W., Lake Township; USGS Ruthven, Iowa, topographic quadrangle; lat. 43 degrees 12 minutes 35 seconds N. and long. 94 degrees 59 minutes 13 seconds W., NAD 27:

Ap—0 to 5 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few very fine roots; about 5 percent gravel; strongly effervescent; moderately alkaline; abrupt wavy boundary.

Bk—5 to 23 inches; light olive brown (2.5Y 5/4) loam; weak fine and medium subangular blocky structure; friable; few very fine roots; common very pale brown (10YR 8/2) masses of calcium carbonate; about 10 percent gravel; violently effervescent; moderately alkaline; abrupt wavy boundary.

C1—23 to 41 inches; light olive brown (2.5Y 5/4) loam; massive; friable; few very fine roots; few very pale brown (10YR 8/2) masses of calcium carbonate; about 10 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.

C2—41 to 56 inches; light olive brown (2.5Y 5/4) fine sandy loam; massive; very friable; few very pale brown (10YR 8/2) masses of calcium carbonate; about 10 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—56 to 70 inches; light olive brown (2.5Y 5/4) loam; massive; friable; about 10 percent gravel; common medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline; clear smooth boundary.

C4—70 to 80 inches; light olive brown (2.5Y 5/4) fine sandy loam; massive; very friable; few fine and medium prominent strong brown (7.5YR 4/6) iron concretions; about 3 percent gravel; common medium faint yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 0 to 10 inches
*Depth to carbonates:* 0 to 10 inches

*Ap horizon:*
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—loam
Reaction—slightly alkaline or moderately alkaline

*Bk horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 or 4
Texture—loam or fine sandy loam
Reaction—slightly alkaline or moderately alkaline

*C horizon:*
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 or 4
Texture—fine sandy loam, loam, or sandy loam
Reaction—slightly alkaline or moderately alkaline

## Talcot Series

### Typical Pedon

Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes, in a cultivated field; 2,600 feet east and 1,350 feet north of the southwest corner of sec. 27, T. 96 N., R. 35 W., Freeman Township; USGS Silver Lake, Iowa, topographic quadrangle; lat. 43 degrees 06 minutes 05 seconds N. and long. 94 degrees 57 minutes 46 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) clay loam, very dark gray (N 3/0) dry; weak fine granular structure; friable; common fine and medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

A—7 to 21 inches; black (N 2/0) clay loam, very dark gray (N 3/0) dry; weak fine subangular blocky structure; friable; common fine and medium roots; violently effervescent; moderately alkaline; gradual wavy boundary.

AB—21 to 24 inches; very dark gray (5Y 3/1) and dark gray (5Y 4/1) clay loam, olive gray (5Y 5/2) dry; weak fine and medium subangular blocky structure; friable; common fine and medium roots; common black (10YR 2/1) iron-manganese nodules; common yellowish brown (10YR 5/8) iron concretions; common medium faint olive gray (5Y 4/2) redoximorphic concentrations; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bg—24 to 36 inches; gray (5Y 5/1) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; common black (10YR 2/1) iron-manganese nodules; common yellowish brown (10YR 5/8) iron concretions; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg1—36 to 38 inches; dark gray (5Y 4/2) gravelly loamy sand; single grain; loose; common very fine and fine roots; about 15 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg2—38 to 62 inches; dark gray (5Y 4/2) gravelly sand; single grain; loose; about 25 percent gravel; many fine and medium prominent dark yellowish brown (10YR 4/6) redoximorphic concentrations and iron concretions; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg3—62 to 80 inches; olive gray (5Y 4/2) gravelly sand; single grain; loose; about 25 percent gravel; strongly effervescent; moderately alkaline.

### Range in Characteristics

*Thickness of the mollic epipedon:* 14 to 24 inches
*Depth to contrasting material:* 24 to 40 inches

*A horizon:*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—clay loam
Reaction—slightly alkaline or moderately alkaline

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—clay loam, silty clay loam, or loam
Reaction—slightly alkaline or moderately alkaline

*2Cg horizon:*
Hue—2.5Y or 5Y
Value—2 to 6
Chroma—2 or 3
Texture—coarse sand, sand, or loamy sand or the gravelly analogs of these textures
Reaction—slightly alkaline or moderately alkaline

## Terril Series

### Typical Pedon

Terril loam, 2 to 5 percent slopes, in a cultivated field; 150 feet west and 210 feet north of the southeast corner of sec. 27, T. 94 N., R. 36 W., Herdland Township; USGS Webb, Iowa, topographic quadrangle; lat. 42 degrees 55 minutes 30 seconds N. and long. 95 degrees 04 minutes 22 seconds W., NAD 27:

Ap—0 to 7 inches; black (10YR 2/1) loam, very dark

gray (10YR 3/1) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A1—7 to 16 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; slightly acid; gradual smooth boundary.

A2—16 to 24 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

A3—24 to 30 inches; very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common fine roots; neutral; gradual smooth boundary.

BA—30 to 36 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; friable; common fine roots; very dark grayish brown (10YR 3/2) coatings on faces of peds; neutral; clear smooth boundary.

Bw1—36 to 43 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; neutral; gradual smooth boundary.

Bw2—43 to 51 inches; mixed dark brown (10YR 3/3) and brown (10YR 4/3) clay loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; friable; neutral; gradual smooth boundary.

BC—51 to 61 inches; brown (10YR 4/3) clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

C1—61 to 72 inches; mixed brown (10YR 4/3) and dark yellowish brown (10YR 4/4) loam; massive; friable; few and common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; gradual smooth boundary.

C2—72 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* More than 24 inches
*Depth to carbonates:* More than 40 inches
*Depth to till:* More than 40 inches

*Ap and A horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Reaction—slightly acid or neutral

*BA, Bw, and BC horizons:*
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—3 or 4
Texture—loam or clay loam
Reaction—slightly acid or neutral

*C horizon:*
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—loam, clay loam, or sandy loam
Reaction—neutral or slightly alkaline

## Wacousta Series

### Typical Pedon

Wacousta silty clay loam, depressional, 0 to 1 percent slopes, about 3 miles southwest of Bode; 850 feet north and 2,240 feet east of the southwest corner of sec. 25, T. 93 N., R. 30 W.; USGS Bode topographic quadrangle; lat. 42 degrees 50 minutes 10 seconds N. and long. 94 degrees 20 minutes 06 seconds W., NAD 27:

Ap—0 to 9 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; cloddy parting to weak medium granular structure; friable; neutral; clear smooth boundary.

A—9 to 14 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; very dark gray (10YR 3/1) kneaded; weak fine granular and weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

Bg—14 to 16 inches; dark gray (5Y 4/1) and olive gray (5Y 4/2) silty clay loam; weak medium subangular blocky structure; firm; common medium distinct olive brown (2.5Y 4/4) iron concentrations; slightly alkaline; clear smooth boundary.

Cg1—16 to 28 inches; olive gray (5Y 5/2) silty clay loam; massive; friable; some dark olive gray (5Y 3/2) materials in root channels; common medium distinct olive brown (2.5Y 4/4) and common coarse distinct yellowish brown (10YR 5/4) iron concentrations; slightly effervescent; slightly alkaline; diffuse smooth boundary.

Cg2—28 to 60 inches; light olive gray (5Y 6/2) silt

loam; massive; friable; some very fine and fine sand grains; few fine dark oxides; common fine prominent yellowish brown (10YR 5/4) iron concentrations; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 12 to 20 inches
*Thickness of the mollic epipedon:* 8 to 18 inches

*Ap or A horizon:*
Hue—10YR or N
Value—2
Chroma—0 or 1
Texture—silty clay loam or mucky silty clay loam
Reaction—slightly alkaline to slightly acid

*Bg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam
Reaction—neutral or slightly alkaline

*Cg horizon:*
Hue—5Y
Value—5 or 6
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly alkaline or moderately alkaline

## Wadena Series

### Typical Pedon

Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes, in a cultivated field; 2,000 feet south and 150 feet west of the northeast corner of sec. 4, T. 96 N., R. 37 W., Summit Township; USGS Spencer, Iowa, topographic quadrangle; lat. 43 degrees 09 minutes 51 seconds N. and long. 95 degrees 12 minutes 38 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.
A—8 to 15 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; common very fine and fine roots; slightly acid; gradual smooth boundary.
AB—15 to 18 inches; very dark grayish brown (10YR 3/2) loam; some mixing of brown (10YR 4/3) loam; brown (10YR 4/3) dry; weak fine subangular blocky structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.
Bw—18 to 29 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; common very fine and fine roots; slightly acid; abrupt wavy boundary.
2C1—29 to 55 inches; brown (7.5YR 4/3 and 4/4) gravelly sand; single grain; loose; about 30 percent gravel; neutral; clear smooth boundary.
2C2—55 to 80 inches; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; about 40 percent gravel; slightly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 30 to 60 inches
*Thickness of the mollic epipedon:* 12 to 24 inches
*Depth to contrasting material:* 24 to 40 inches

*A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam
Reaction—slightly acid or neutral

*Bw horizon:*
Hue—10YR or 7.5YR
Value—3 to 6
Chroma—3 or 4
Texture—loam or clay loam
Reaction—slightly acid or neutral

*2C horizon:*
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—2 to 4
Texture—coarse sand or sand or the gravelly or very gravelly analogs of these textures
Reaction—neutral to moderately alkaline

## Waldorf Series

### Typical Pedon

Waldorf silty clay, 0 to 2 percent slopes, in a cultivated field; 93 feet east and 1,800 feet south of the northwest corner of sec. 12, T. 96 N., R. 36 W., Sioux Township; USGS Dickens, Iowa, topographic quadrangle; lat. 43 degrees 08 minutes 50 seconds N. and long. 95 degrees 03 minutes 01 second W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) silty clay, very dark gray (10YR 3/1) dry; moderate fine granular structure; firm; slightly acid; abrupt smooth boundary.
A—7 to 15 inches; black (10YR 2/1) silty clay, very

dark gray (10YR 3/1) dry; moderate fine granular structure; firm; slightly acid; gradual smooth boundary.

AB—15 to 22 inches; very dark gray (5Y 3/1) silty clay, dark gray (5Y 4/1) dry; moderate very fine subangular blocky structure; firm; many distinct black (10YR 2/1) organic coatings on faces of peds; common fine faint dark olive gray (5Y 3/2) redoximorphic depletions; neutral; clear smooth boundary.

Bg1—22 to 32 inches; olive gray (5Y 4/2) silty clay; moderate very fine prismatic structure parting to moderate very fine subangular blocky; firm; common distinct dark gray (5Y 4/1) organic coatings on faces of peds; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; neutral; clear wavy boundary.

Bg2—32 to 40 inches; olive gray (5Y 5/2) silty clay; moderate very fine prismatic structure parting to moderate fine subangular blocky; firm; common distinct olive gray (5Y 4/2) organic coatings on faces of peds; many fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bkg1—40 to 48 inches; olive gray (5Y 5/2) clay; weak very fine prismatic structure parting to moderate fine and medium subangular blocky; firm; common fine very pale brown (10YR 8/2) masses of calcium carbonate; many fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bkg2—48 to 56 inches; olive gray (5Y 5/2) silty clay; weak very fine prismatic structure parting to moderate fine and medium subangular blocky; firm; common fine very pale brown (10YR 8/2) masses of calcium carbonate; many fine prominent light olive brown (2.5Y 5/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

BCg—56 to 69 inches; olive gray (5Y 5/2) silty clay; weak fine prismatic structure; firm; common fine very pale brown (10YR 8/2) masses of calcium carbonate; many fine prominent light olive brown (2.5Y 5/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; gradual smooth boundary.

Cg—69 to 80 inches; olive gray (5Y 5/2) silty clay loam; massive; friable; many fine prominent light olive brown (2.5Y 5/6) and common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 26 to 55 inches
*Thickness of the mollic epipedon:* 16 to 24 inches

*Ap, A, and AB horizons:*
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay
Reaction—neutral or slightly acid

*Bg and Bkg horizons:*
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay, silty clay loam, or clay
Reaction—neutral or slightly alkaline

*BCg and Cg horizons:*
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay, silty clay loam, clay, or silt loam
Reaction—slightly alkaline or moderately alkaline

## *Webster Series*

### *Typical Pedon*

Webster silty clay loam, 0 to 2 percent slopes, in a cultivated field; 240 feet south and 288 feet west of the northeast corner of sec. 13, T. 94 N., R. 36 W., Herdland Township; USGS Webb, Iowa, topographical quadrangle; lat. 42 degrees 58 minutes 06 seconds N. and long. 95 degrees 02 minutes 06 seconds W., NAD 27:

Ap—0 to 7 inches; black (N 2/0) silty clay loam, black (10YR 2/1) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; friable; slightly acid; abrupt smooth boundary.

A—7 to 14 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; friable; slightly acid; gradual smooth boundary.

AB—14 to 18 inches; black (10YR 2/1) silty clay loam grading to very dark gray (2.5Y 3/1) in the lower part; very dark gray (10YR 3/1) dry; moderate fine and medium subangular blocky structure; friable; neutral; clear smooth boundary.

Bg1—18 to 24 inches; dark gray (2.5Y 4/1) silty clay

loam; moderate fine and medium angular and subangular blocky structure; friable; few very fine dark manganese concretions; distinct very dark gray (2.5Y 3/1) organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; few medium faint grayish brown (2.5Y 5/2) redoximorphic depletions; neutral; gradual smooth boundary.

Bg2—24 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay loam; moderate fine and medium angular and subangular blocky structure; friable; many fine dark manganese concretions; common fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; common medium and fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; noneffervescent; slightly alkaline; clear smooth boundary.

Bg3—30 to 41 inches; olive gray (5Y 5/2) loam; weak fine and medium subangular blocky structure; friable; few medium and large prominent strong brown (7.5YR 5/6) iron oxides; many fine dark manganese concretions; thin lens of sandy loam at a depth of 39 to 41 inches; about 2 percent gravel; many fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt wavy boundary.

BCg—41 to 47 inches; olive gray (5Y 5/2) loam; weak fine and medium subangular blocky structure; friable; common fine dark manganese concretions; common white (10YR 8/1) calcium carbonate nodules; about 2 percent gravel; common fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

Cg1—47 to 56 inches; olive gray (5Y 5/2) loam; massive; friable; few fine dark manganese concretions; few white (10YR 8/1) calcium carbonate nodules; about 2 percent gravel; common fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly effervescent; moderately alkaline; gradual smooth boundary.

Cg2—56 to 61 inches; olive gray (5Y 5/2) loam; massive; friable; common fine dark manganese concretions; few fine and medium strong brown (7.5YR 4/6) iron accumulations; few white (10YR 8/2) calcium carbonate nodules; about 3 percent gravel; many fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly effervescent; moderately alkaline; clear smooth boundary.

Cg3—61 to 74 inches; olive gray (5Y 5/2) loam; massive; friable; very few dark manganese concretions; few very pale brown (10YR 8/2) calcium carbonate nodules; about 5 percent gravel; many fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly effervescent; moderately alkaline; clear smooth boundary.

Cg4—74 to 80 inches; olive gray (5Y 5/2) loam; massive; friable; common fine and medium dark manganese concretions; few fine distinct strong brown (7.5YR 5/8) iron oxides; few very pale brown (10YR 8/2) calcium carbonate nodules; about 5 percent gravel; many fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 24 to 60 inches
*Thickness of the mollic epipedon:* 14 to 24 inches

*Ap, A, and AB horizons:*
Hue—10YR, 2.5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam
Reaction—neutral or slightly acid

*Bg horizon:*
Hue—5Y or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—clay loam, loam, or silty clay loam that has a high content of sand
Reaction—neutral or slightly alkaline

*BCg horizon:*
Hue—5Y or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—loam or clay loam
Reaction—neutral or slightly alkaline

*Cg horizon:*
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—loam or sandy loam
Reaction—slightly alkaline or moderately alkaline

## *Wilmonton Series*

### *Typical Pedon*

Wilmonton clay loam, 1 to 3 percent slopes, in a cultivated field; 400 feet south and 1,850 feet east of

the northwest corner of sec. 36, T. 96 N., R. 37 W., Riverton Township; USGS Greenville, Iowa, topographic quadrangle; lat. 43 degrees 05 minutes 43 seconds N. and long. 95 degrees 09 minutes 51 seconds W., NAD 27:

Ap—0 to 8 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

A—8 to 14 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; neutral; gradual wavy boundary.

AB—14 to 19 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure; friable; common very fine and fine roots; common mixings of light olive brown (2.5Y 5/4) subsoil material; neutral; gradual wavy boundary.

2Bw—19 to 26 inches; light olive brown (2.5Y 5/4) clay loam; moderate medium subangular blocky structure; firm; common very fine and fine roots; very few distinct yellowish brown (10YR 5/8) iron oxide coatings on faces of peds and in pores; common medium black (10YR 2/1) wormcasts; common fine distinct grayish brown (2.5Y 5/2) redoximorphic depletions; neutral; gradual wavy boundary.

2Bk—26 to 35 inches; light olive brown (2.5Y 5/4) clay loam; moderate medium subangular blocky structure; firm; very few distinct yellowish brown (10YR 5/8) iron oxide coatings on faces of peds and in pores; common fine and medium white (10YR 8/1) calcium carbonate nodules; common fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; slightly effervescent; slightly alkaline; clear wavy boundary.

2BC1—35 to 58 inches; light olive brown (2.5Y 5/4) clay loam; weak coarse prismatic structure; firm; few prominent yellowish brown (10YR 5/8) iron oxide coatings on faces of peds; common fine and medium white (10YR 8/1) calcium carbonate nodules; common fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; many medium and coarse distinct grayish brown (2.5Y 5/2) redoximorphic depletions; violently effervescent; moderately alkaline; gradual wavy boundary.

2BC2—58 to 80 inches; light olive brown (2.5Y 5/4) clay loam; weak coarse subangular blocky structure; firm; common fine and medium prominent yellowish brown (10YR 5/6) redoximorphic concentrations; common fine and medium white (10YR 8/1) calcium carbonate nodules; many medium and coarse distinct grayish brown (2.5Y 5/2) redoximorphic depletions; violently effervescent; moderately alkaline.

### *Range in Characteristics*

*Depth to carbonates:* 20 to 40 inches
*Thickness of the mollic epipedon:* 14 to 24 inches

*Ap, A, and AB horizons:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—clay loam or silty clay loam
Reaction—slightly acid or neutral

*2Bw horizon:*
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly acid or neutral

*2Bk horizon:*
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—loam or clay loam
Reaction—slightly alkaline or moderately alkaline

*2BC horizon:*
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

## *Zenor Series*

*Taxadjunct features:* The Zenor soil in map unit 828C2 does not have a mollic epipedon. This soil is classified as a coarse-loamy, mixed, superactive, mesic Typic Eutrudept.

### *Typical Pedon*

Zenor sandy loam, 2 to 5 percent slopes, in a cultivated field; 2,150 feet west and 50 feet south of the northeast corner of sec. 25, T. 94 N., R. 35 W., Garfield Township; USGS Rush Lake West, Iowa, topographic quadrangle; lat. 42 degrees 56 minutes 18 seconds N. and long. 94 degrees 55 minutes 10 seconds W., NAD 27:

Ap—0 to 8 inches; very dark brown (10YR 2/2) sandy

loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; friable; common very fine roots; about 5 percent gravel; neutral; abrupt smooth boundary.

A—8 to 14 inches; very dark brown (10YR 2/2) sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; common very fine roots; about 5 percent gravel; neutral; gradual wavy boundary.

AB—14 to 18 inches; dark brown (10YR 3/3) and brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; friable; common very fine roots; about 5 percent gravel; neutral; gradual wavy boundary.

Bw—18 to 25 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine and medium subangular blocky structure; friable; common very fine roots; about 5 percent gravel; neutral; gradual wavy boundary.

C1—25 to 42 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable; few medium very pale brown (10YR 8/2) calcium carbonate nodules; about 5 percent gravel; strongly effervescent; slightly alkaline; gradual wavy boundary.

C2—42 to 80 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few medium very pale brown (10YR 8/2) calcium carbonate nodules; about 5 percent gravel; strongly effervescent; slightly alkaline.

### Range in Characteristics

*Depth to carbonates:* 20 to 40 inches
*Thickness of the mollic epipedon:* 10 to 20 inches

*Ap or A horizon:*
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—sandy loam
Reaction—slightly acid or neutral

*AB horizon:*
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—sandy loam or loam
Reaction—slightly acid or neutral

*Bw horizon:*
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—sandy loam or loam
Reaction—slightly acid or neutral

*C horizon:*
Hue—7.5YR, 10YR, or 2.5Y
Value—5 to 7
Chroma—3 to 6
Texture—sandy loam, loamy sand, gravelly loamy sand, or gravelly sand
Reaction—neutral to moderately alkaline

## Zook Series

### Typical Pedon

Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded, in a cultivated field; 2,200 feet north and 100 feet east of the southwest corner of sec. 9, T. 94 N., R. 36 W., Herdland Township; USGS Webb, Iowa, topographic quadrangle; lat. 42 degrees 59 minutes 13 seconds N. and long. 95 degrees 06 minutes 02 seconds W., NAD 27:

Ap—0 to 6 inches; black (N 2/0) silty clay loam, very dark gray (N 3/0) dry; weak fine granular and weak fine angular blocky structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

A1—6 to 19 inches; black (N 2/0) silty clay, very dark gray (N 3/0) dry; weak fine granular and weak fine angular blocky structure; friable; common very fine and fine roots; slightly acid; gradual wavy boundary.

A2—19 to 26 inches; black (N 2/0) silty clay, very dark gray (N 3/0) dry; weak medium subangular blocky and weak fine angular blocky structure; friable; common very fine roots; slightly acid; gradual wavy boundary.

A3—26 to 40 inches; black (N 2/0 and 10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate fine and medium angular blocky structure; friable; common very fine roots; common very dark brown (10YR 2/2) pressure faces; neutral; gradual wavy boundary.

Bg1—40 to 54 inches; very dark gray (2.5Y 3/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine prismatic structure; friable; common very dark brown (10YR 2/2) pressure faces; neutral; gradual wavy boundary.

Bg2—54 to 74 inches; dark gray (5Y 4/1) silty clay; moderate fine prismatic structure; firm; many very dark grayish brown (10YR 3/2) pressure faces; common fine prominent olive brown (2.5Y 4/4) redoximorphic concentrations; neutral; gradual wavy boundary.

Cg—74 to 80 inches; very dark gray (2.5Y 3/1) silty clay; massive; firm; common very dark grayish

brown (10YR 3/2) pressure faces; few fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; neutral.

### *Range in Characteristics*

*Depth to carbonates:* 50 or more inches
*Thickness of the mollic epipedon:* 36 to 60 inches

*A horizon:*
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silty clay
Reaction—neutral to moderately acid

*Bg and Cg horizons:*
Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam or silty clay
Reaction—slightly acid or neutral

# Formation of the Soils

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by five major soil-forming factors: the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material (Jenny, 1941). Human activities also affect soil formation.

Climate and plant and animal life, chiefly plants, are the active factors of soil formation. They act on parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. Relief conditions the effects of climate and plant and animal life. The parent material also affects the kind of profile that can be formed and in extreme cases determines it almost entirely. Finally, time is needed for the changing of parent material into a soil. The length of time may be short or long, but some time is required for the differentiation of soil horizons. A long period of time is generally required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the others.

## Climate

The soils in Clay County formed under a variety of climatic conditions. The older soils of the MLRA 107 area, which is in the western two-thirds of the county, began forming following loess deposition about 12,500 years ago when the climate began to warm and become less humid. Although this part of Clay County was not glaciated during the Cary Glacial Period, the return to much colder conditions immediately to the east certainly had an effect on the type of vegetative growth and slowed down the formation processes. The soils of the MLRA 103 area, which is in the eastern one-third of the county, began forming following the last glacial period in Iowa. During the post-Cary glaciation period, 13,800 to 10,500 years ago, the climate was cool and the vegetation was dominantly conifers (Walker, 1966b). During the period beginning about 10,500 years ago and ending about 8,000 years ago, a warming trend changed the vegetation from conifers to mixed hardwoods. Beginning about 8,000 years ago, the climate became warmer and drier and herbaceous prairie vegetation became dominant. A change from a dry to a moister climate began about 3,000 years ago (McComb and Loomis, 1944). The present climate is referred to as subhumid and midcontinental.

A nearly uniform climate presently prevails throughout the survey area. The general climate has had an important overall influence on the characteristics of the soils but has not created major differences among them. The influence of the general climate of the region, however, is modified by local conditions. For example, soils on south-facing slopes formed under a microclimate that is warmer and less humid than the average climate in nearby areas. The climate under which poorly drained or very poorly drained soils in low areas, such as bottom lands or depressions, have been forming is typically wetter and colder than in most of the surrounding areas.

Changes in temperature activate the weathering of parent material by water and air. As the parent material weathers, changes caused by physical and chemical actions take place. Rainfall affects the amount of leaching in the soil and the kinds of plants that grow on the soil. Climate indirectly affects soil formation through the effects of temperature and other climatic factors on the plant and animal life on and in the soil. Clay County is on the border of the more humid conditions of central and eastern Iowa and the less humid conditions of western Iowa and the bordering states of South Dakota and Nebraska. The less humid conditions have had an influence on the soil properties of the reddish, gravelly soils of the May City series. These soils are high in iron and calcium carbonates because of the climatic effects on the weathering processes.

## Living Organisms

All living organisms, including vegetation, animals, bacteria, and fungi, are important factors of soil formation, and plants are especially significant (McComb and others, 1961). Native grasses typically have an abundance of above-ground growth as well as a myriad of fibrous roots that penetrate the soil to an average depth of 10 to 20 inches. As these plants grow and, particularly, when they die, they add large amounts of organic matter to the surface layer and add various nutrients to the surface layer and the subsoil. Trees commonly feed on plant nutrients deep in the subsoil and contribute little organic material to the surface layer, other than that added by fallen leaves, twigs, and branches. Much of the organic material from dead trees actually remains on the soil surface.

Most of the soils of Clay County formed under prairie grasses (fig. 9) or a mixture of prairie grasses and water-tolerant plants. Some soils in Clay County formed strictly under vegetation consisting of water-tolerant plants. Clarion and Sac soils formed under prairie grasses. In areas that have not eroded, these soils typically have a dark surface layer that is 10 to 20 inches thick and have a content of organic matter of 3 to 5 percent. Afton and Webster soils formed under prairie grasses and water-tolerant plants. Klossner and Okoboji soils formed under vegetation consisting of water-tolerant plants. These soils typically have a black surface layer that is 20 to more than 30 inches thick and have a very high content of organic matter.

The vegetation chiefly determines the color of the surface layer and the content of organic matter and nutrients in the soil, and the roots create soil pores and root channels. Earthworms and other burrowing animals also help to create soil pores and keep the soil porous. Bacteria and fungi decompose the vegetation and thereby release plant nutrients.

## Topography

Relief indirectly influences soil formation through its effect on soil drainage, runoff, and erosion. In the steeper areas, more water runs off the surface and less percolates into the soil. The higher runoff rate results in less leaching of carbonates and less movement of clay from the surface horizon into the subsoil. The susceptibility to erosion increases as slope increases. Much of Clay County is nearly level to moderately sloping, but small areas, particularly along the major rivers and streams, are strongly sloping to very steep.

The aspect of the slope affects soil formation. For example, south-facing slopes generally are warmer and drier than north-facing slopes. As a result, they typically support a different kind of vegetation.

The strongly sloping to steep Storden soils, gently sloping to strongly sloping Clarion soils, and nearly level and very gently sloping Nicollet soils, all of which formed in the same kind of parent material and under similar vegetation, differ because of differences in topographic position. The thickness and color of the A horizon and the thickness of the solum in these soils are affected by slope. The A horizon and the solum are thicker and the A horizon is darker in the less sloping soils than in steeper areas.

The nearly level and depressional soils in Clay County commonly have a gray or mottled subsoil as a result of poor aeration and restricted internal drainage. Gillett Grove, Okoboji, and Webster soils are examples. In the depressional Okoboji soils, water is periodically impounded on the surface, sometimes for weeks or longer. Rolfe soils are another example of depressional soils that impound water and are very poorly drained. As the Rolfe soils formed, the impounded water percolated through the surface layer, removing clay-sized particles and redepositing them in the subsoil. This movement of clay accelerated the formation of the Rolfe soils. These soils typically have a distinctly silty, light-colored subsurface layer and a gray, clayey subsoil.

The micro-relief of the nearly level Coland and Spillville soils on bottom land affects runoff, depth to the water table, and the rate at which new sediments are deposited. Coland soils are in low positions on the landscape, generally some distance from the main stream channel. They are poorly drained and impound water for short periods. Spillville soils are typically slightly higher on the landscape than the Coland soils, are generally closer to the stream channel, and are better drained.

## Parent Material

The accumulation of parent material is the first step in the formation of a soil. Most soils formed in material that was transported from the site of the parent material and redeposited at a new location through the action of glacial ice, water, wind, and gravity. The principal kinds of parent material are glacial drift, loess, alluvium, eolian sands, lacustrine sediments, and organic material.

Glacial drift is rock material transported and deposited by glacial ice, including the material sorted and unsorted by meltwater. It includes till, glacial sediments, and glacial outwash. Till consists of unsorted deposits in which particles range in size from boulders to clay. Glacial sediments are the loamy


**Figure 9.—Small areas of native prairie grasses and wildflowers are preserved throughout Clay County. These areas provide wildlife habitat, preserve plant species, and promote an appreciation for precultivation conditions. This type of prairie vegetation originally produced thick, dark topsoil across Clay County and northwestern Iowa.**

materials that have been sorted to some extent by water. The fact that these sediments are in potholes or in other low areas on the landscape indicates that some of the sorting and deposition occurred since the time of glaciation as well as during the ice age. Glacial outwash is the sandy and gravelly material sorted by glacial meltwater and deposited in valleys (generally on relatively flat outwash plains) or in other areas where water was concentrated.

The area that is now Clay County underwent at least three major episodes of glaciation. These include at least two early Pleistocene glacial stages (previously called the Nebraskan and Kansan but now referred to collectively as the Pre-Illinoian) and the younger Wisconsinan glacial stage. The Pre-Illinoian till in Clay County is buried in all areas by drift of the Wisconsinan glacial stage. The area of the county in MLRA 107 has till that formed in the Tazewell substage, often referred to as the Sheldon Creek Formation of the Wisconsinan glacial stage. Radiocarbon dating indicates that this drift was deposited about 20,000 to 30,000 years ago. Most of the Sheldon Creek material is buried by 2 to 5 feet of loess or loamy surficial sediments. Moneta soils are the only soils in MLRA 107 area that developed completely in drift and are exposed at the soil surface by erosion of the loess. Moneta soils are on steep and very steep side slopes along the major rivers and streams. Everly soils formed in loamy sediments overlying the Sheldon Creek till on gently sloping and moderately sloping uplands. The area of the county in MLRA 103 has till that formed in the Cary substage of the Wisconsin glacial period (Ruhe, 1969). This area is often referred to as the Cary Lobe or Des Moines

Lobe. Radiocarbon dating indicates that this drift was deposited about 12,500 to 14,000 years ago. Most of the soils of the Cary substage occur on ground moraines and end moraines. Clarion, Nicollet, and Storden soils formed in till of the Cary substage. Canisteo, Harps, and Webster soils are in the lower areas on the landscape and formed in loamy sediments and till (Walker, 1966a). Okoboji soils formed in sediments derived from till that in some places eroded from nearby slopes. Zenor soils formed in glacial outwash.

Loess is silty material deposited by the wind. Loess consists mainly of silt- and clay-sized particles and small amounts (generally less than 15 percent) of fine and very fine sand. The loess in Clay County typically ranges from 20 to 60 inches in thickness and commonly overlies Tazewell-age drift. According to recent geology studies (Prior, 1991), the Wisconsin-age loess in Iowa ranges in age from about 12,500 to 31,000 years. The loess was transported to the area following extensive erosion of the glacial surface, which filled river valleys with massive amounts of sediment. Although some of the loess is from local sources near the area, most of the material originated from the Missouri River and Big Sioux River valleys.

Alluvium is sediment deposited by water along rivers and streams, in upland drainageways, in depressional areas, and on stream terraces. The texture of alluvium varies widely because of the differences in the material from which it was derived and the manner in which it was deposited. Coland, Spillville, and Zook soils formed in alluvium on bottom land that is subject to flooding, typically within large watershed areas. Alluvium that has been transported only a short distance is referred to as local alluvium. Local alluvium retains many of the characteristics of the soils from which it was transported. The calcareous Calco soils formed in local alluvium with the surrounding calcareous till as its source. Local alluvium transported and deposited by the forces of gravity, typically at the base or footslopes of much steeper slopes, is often referred to as colluvium. Terril soils formed in local alluvium and/or colluvium, commonly downslope from soils that formed in till. Biscay, Cylinder, and Wadena soils formed in loamy alluvium underlain by sand and gravel on stream terraces. The material from which these latter soils formed was mainly deposited by the meltwater from the receding Cary glacial substage.

Eolian soils formed in sandy material deposited by the wind, typically by the prevailing northwest winds. The source of the sands is local in origin, and the deposits are commonly in the uplands, particularly along the east side of the Little Sioux and Ocheyedan Rivers. Dickinson, Roine, and Sparta soils formed in eolian sands.

Lacustrine or glaciolacustrine sediment is typically fine textured, water-sorted material deposited by nearly still waters near the margin of the glacial ice rather than by rapidly moving meltwater. Lacustrine sediments originated as deposits in depressions and troughs on the Cary ice sheet. When the glacial ice melted, the sediments remained in closed depressions surrounded by till, or they stood out in relief as ridges. Lacustrine sediments are typically silty clay loam or silty clay and commonly range from 3 to 5 feet in thickness. Some of the lacustrine sediments have a thin mantle of loess or loamy sediments, and most are underlain directly by till or by thick redeposited sand and gravel overlying the till. These sediments are scattered across the MLRA 103 area of the county. Collinwood and Waldorf soils formed in these sediments.

The most extensive area of lacustrine sediments in Clay County occupies an area known geologically as Glacial Lake Spencer. This area lies mainly north and east of the city of Spencer and extends to nearby Dickens. This relict lake formed during the Post-Tazewell substage and prior to the Cary substage of the Wisconsinan glacial stage, when ice and/or debris blocked the flow of the Little Sioux River near Gillett Grove. The lake emptied when the blockage was breached by glacial meltwater, most likely from the immediately adjacent Cary Lobe. Geological evidence indicates that the drainage from this large watershed, which had supposedly drained to the Mississippi River prior to the creation of the lake, changed its course when the ice dam was breached. The new channel that was created flowed to the Missouri River. The silty to clayey lacustrine sediments in the relict Glacial Lake Spencer area are as much as 15 to 20 feet thick. Belmann soils and the Dickinson and Ocheyedan soils that have a lacustrine substratum formed in the Glacial Lake Spencer area.

Organic material consists of partially decomposed plant materials that accumulated in old lakebeds, marshy areas, and side hill seeps that supported a heavy growth of aquatic plants. Till, lacustrine sediment, or some other less permeable material typically underlies these deposits and has kept the surrounding area wet. In places, these organic materials exceed 4 feet in thickness. Klossner soils formed in organic deposits in marshy areas and old lakebeds. Some soils, such as Knoke mucky silty clay loam, have a thin surface layer that formed in organic material, although the rest of the profile formed in alluvial sediments. Many unique areas of organic material, called fens, formed mainly on steep or very

steep slopes where water-saturated gravel, underlain by denser till on the upper part of the slopes, results in side hill seeps. These areas typically have hydrophytic flora and fauna that do not exist in other areas of organic soils. Fen Valley, an area near Gillett Grove preserved by the Iowa Department of Natural Resources, contains many of the fens in Clay County. Most of the original organic soils in the county, including many of the fens areas, have been artificially drained.

## Time

The passage of time enables relief, climate, and plant and animal life to bring about changes in the parent material. If these factors are active for long periods, very similar kinds of soil can form in widely different kinds of parent materials. Soil formation, however, is generally interrupted by geologic events that expose new parent materials. In Clay County, new parent material has been added to the entire upland landscape at least four times (Simonson and others, 1952). The bedrock was covered by Pre-Illinoian glacial drift at least twice, by loess and by glacial drift of the Tazewell substage of the Wisconsinan glacial stage. The eastern one-third of the county was covered by the Cary substage of the Wisconsinan glacial stage, which overlies the previous materials. New parent material is added to the upland drainageways and to the bottom land with every passing erosional or flooding event and typically creates the youngest soils in the county.

Geologically, the soils of Clay County are young. The radiocarbon technique for determining the age of carbonaceous material found in organic deposits as well as in till has made it possible to determine the approximate age of the soil materials in Iowa. The dating process has indicated that the soils that formed in loess in the MLRA 107 area are at least 12,500 years old. In much of Iowa, including Clay County, erosion has beveled and in places removed the loess material from side slopes and redeposited it as new sediment downslope. Thus, the surfaces of the soils on nearly level and very gently sloping upland divides, such as McCreath soils, are older than the eroded side slopes of the Sac soils (less than 12,500 years). Both the McCreath and Sac soils are older than the alluvial or colluvial sediments of the Afton soils in upland drainageways. Further dating and research indicate that the alluvium deposited at the base of steep side slopes and on bottom land along major rivers and streams is less than 3,000 years old. Terril soils on footslopes and Colo, Coland, and Spillville soils on bottom land represent some of the younger soils in Clay County.

## Human Activities

Important changes take place in the soil after it is artificially drained and cultivated or altered for such activities as the construction of homes or commercial buildings. Some of these changes have little effect on the processes of soil formation, but others have dramatic effects.

Changes by erosion generally are the most significant. Some of the cultivated or excavated soils in the county, particularly the steeper ones, have lost much of the original surface layer through sheet erosion. This loss of organic matter as well as the finer structure typical in the upper part of the soil profile can reduce vegetative cover and increase runoff. Fortunately, because of the large areas of the county with low relief, many of the soils have not been significantly affected by accelerated erosion.

Artificial drainage of soils, particularly in the MLRA 103 area of the county, has improved conditions for cultivated crop growth but has lowered the water table, increased soil temperature, and changed chemical reactions in these normally cooler, wetter soils.

Such human activities as soil excavation, tree removal, and building construction can also alter the natural soil formation processes through soil compaction and the subsequent decrease in percolation rates.

Management practices have increased the productivity of some soils and have reclaimed areas that otherwise were not suitable for crop production or building sites. Crops can be grown, for example, in many areas where subsurface drainage has sufficiently lowered the water table. Applications of commercial fertilizers have helped to overcome the deficiencies in plant nutrients and organic matter and thus have increased the productivity of many soils, particularly in moderately or severely eroded areas. A knowledge of the soils and history of human activity in specific areas helps to determine whether natural soil conditions occur in that area.

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# Glossary

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

| | |
|---|---|
| Very low | 0 to 3 |
| Low | 3 to 6 |
| Moderate | 6 to 9 |
| High | 9 to 12 |
| Very high | more than 12 |

**Backslope.** The position that forms the steepest and generally linear, middle portion of a hillslope (fig. 10). In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

**Basal till.** Compact till deposited beneath the ice.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope.** A geomorphic component of hills (fig. 10) consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Beach deposits.** Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a post-glacial or glacial lake.

**Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-controlled topography.** A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

**Bench (structural).** A platformlike, nearly level to gently inclined erosional surface developed in resistant strata in areas where valleys are cut in alternating strong and weak layers that are essentially horizontal.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Blowout.** A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

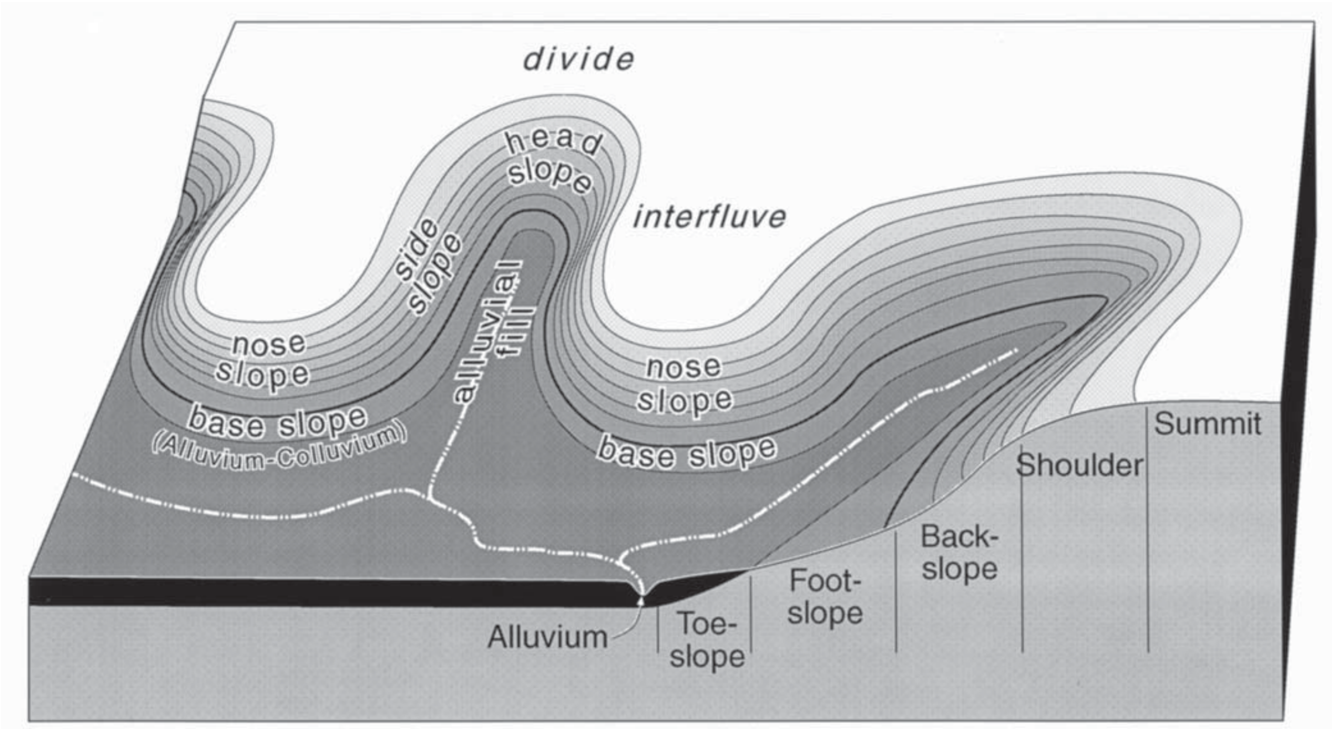



**Figure 10.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).**

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Brush management.** Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena.** A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

**Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Catsteps.** Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

**Channery soil material.** Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

**Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Delta.** A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divide.** (a) The line of separation, or (b) the summit area, or narrow tract of higher ground that constitutes the watershed boundary between two adjacent drainage basins (fig. 10); it divides the surface waters that flow naturally in one direction from those that flow in the opposite direction.

**Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Esker.** A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

**Fan terrace.** A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

**Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Flood-plain splay.** A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Footslope.** The position that forms the inner, gently inclined surface at the base of a hillslope (fig. 10). In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

**Forb.** Any herbaceous plant not a grass or a sedge.

**Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Geomorphology.** The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and the history of geologic changes as recorded by these surface features. The term is especially applied to the genetic interpretation of landforms.

**Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Graded stripcropping.** Growing crops in strips that grade toward a protected waterway.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to

be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Gumbotil.** A sticky clay formed by the thorough weathering of glacial drift.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head slope.** A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway (fig. 10). The overland waterflow is converging.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-chroma zones.** Zones having chroma of 3 or more. Typical color in areas of iron concentrations.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Ice-walled lake plain.** A relict surface marking the floor of an extinct lake basin that was formed on solid ground and surrounded by stagnant ice in a stable or unstable superglacial environment on stagnation moraines. As the ice melted, the lake plain became perched above the adjacent landscape. The lake plain is well sorted, generally fine textured, stratified deposits.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally,

material is removed from an upper horizon and deposited in a lower horizon.

**Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

| | |
|---|---|
| Less than 0.2 | very low |
| 0.2 to 0.4 | low |
| 0.4 to 0.75 | moderately low |
| 0.75 to 1.25 | moderate |
| 1.25 to 1.75 | moderately high |
| 1.75 to 2.5 | high |
| More than 2.5 | very high |

**Interfluve.** An elevated area between two drainageways that sheds water to those drainageways (fig. 10).

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Iron concentrations.** High-chroma zones having a high content of iron and manganese oxide because of chemical oxidation and accumulation, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic concentration.

**Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Kame.** An irregular, short ridge or hill of stratified glacial drift.

**Kame moraine.** An end moraine that contains numerous kames. A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice.

**Karst** (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake bed.** The bottom of a lake; a lake basin.

**Lake plain.** A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

**Lake terrace.** A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

**Lakeshore.** A narrow strip of land in contact with or bordering a lake; especially the beach of a lake.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^{1}/_{3}$- or $^{1}/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low strength.** The soil is not strong enough to support loads.

**Low-chroma zones.** Zones having chroma of 2 or less. Typical color in areas of iron depletions.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Marl.** An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Meander scroll.** One of a series of long, parallel, close fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**MLRA (major land resource area).** A geographic area characterized by a particular pattern of land uses, elevation and topography, soils, climate, water resources, and potential natural vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine.** An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

**Muck.** Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Natric horizon.** A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

**Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside (fig. 10). The overland waterflow is predominantly divergent.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

| | |
|---|---|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |

**Outwash plain.** A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

**Paleoterrace.** An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Parts per million (ppm).** The concentration of a substance in the soil, such as phosphorus or potassium, in one million parts of air-dried soil on a weight per weight basis.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedisediment.** A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

**Pedon.** The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The movement of water through the soil.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

| | |
|---|---|
| Impermeable | less than 0.0015 inch |
| Very slow | 0.0015 to 0.06 inch |
| Slow | 0.06 to 0.2 inch |
| Moderately slow | 0.2 to 0.6 inch |
| Moderate | 0.6 inch to 2.0 inches |
| Moderately rapid | 2.0 to 6.0 inches |
| Rapid | 6.0 to 20 inches |
| Very rapid | more than 20 inches |

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Phosphorus.** The amount of phosphorus available to plants at a depth of 30 to 42 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms

describing the amount of available phosphorus are:

| | |
|---|---|
| Very low | less than 7.5 ppm |
| Low | 7.5 to 13.0 ppm |
| Medium | 13.0 to 22.5 ppm |
| High | more than 22.5 ppm |

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Pitted outwash plain.** An outwash plain marked by many irregular depressions, such as kettles, shallow pits, and potholes, which formed by melting of incorporated ice masses.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded.** Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Potassium.** The amount of potassium available to plants at a depth of 12 to 24 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available potassium are:

| | |
|---|---|
| Very low | less than 50 ppm |
| Low | 50 to 79 ppm |
| Medium | 79 to 125 ppm |
| High | more than 125 ppm |

**Potential native plant community.** See Climax plant community.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

| | |
|---|---|
| Ultra acid | less than 3.5 |
| Extremely acid | 3.5 to 4.4 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Moderately acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Slightly alkaline | 7.4 to 7.8 |
| Moderately alkaline | 7.9 to 8.4 |
| Strongly alkaline | 8.5 to 9.0 |
| Very strongly alkaline | 9.1 and higher |

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth’s surface; the loose earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material

that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturated hydraulic conductivity.** See Permeability.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shoulder.** The position that forms the uppermost inclined surface near the top of a hillslope (fig. 10). It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside (fig. 10). The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Sloughed till.** Water-saturated till that has flowed slowly downhill from its original place of deposit by

glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

| | |
|---|---|
| Very coarse sand | 2.0 to 1.0 |
| Coarse sand | 1.0 to 0.5 |
| Medium sand | 0.5 to 0.25 |
| Fine sand | 0.25 to 0.10 |
| Very fine sand | 0.10 to 0.05 |
| Silt | 0.05 to 0.002 |
| Clay | less than 0.002 |

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Stagnation moraine.** A body of drift released by the melting of a glacier that ceased flowing. Commonly but not always occurs near ice margins; composed of till, ice-contact stratified drift, and small areas of glacial lake sediment. Typical landforms are knob-and-kettle topography, locally including ice-walled lake plains.

**Stone line.** A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stream terrace.** A platform or series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream, and representing the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former stage of fluvial erosion or deposition.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summit.** The topographically highest position of a hillslope (fig. 10). It has a nearly level (planar or only slightly convex) surface.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Swale.** A slight depression in the midst of generally level land. A shallow depression in an undulating ground moraine caused by uneven glacial deposition.

**Terminal moraine.** A belt of thick glacial drift that generally marks the termination of important glacial advances.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts

surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lakeshore, or seashore. The term is usually applied to both the relatively flat summit surface (tread), cut or built by stream or wave action, and the steeper descending slope (scarp or riser), graded to a lower base level of erosion.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

**Till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Till plain.** An extensive area of nearly level to undulating soils underlain by till.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope.** The position that forms the gently inclined surface at the base of a hillslope (fig. 10). Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley fill.** In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

# Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Spencer, Iowa)

| Month | Temperature | | | | | | Precipitation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 years in 10 will have-- | | | | 2 years in 10 will have-- | | | |
| | Average daily maximum | Average daily minimum | Average | Maximum temperature higher than-- | Minimum temperature lower than-- | Average number of growing degree days* | Average | Less than-- | More than-- | Average number of days with 0.10 inch or more | Average snowfall |
| | $^{o}F$ | $^{o}F$ | $^{o}F$ | $^{o}F$ | $^{o}F$ | Units | In | In | In | | In |
| January---- | 24.6 | 4.6 | 14.6 | 52 | -26 | 0 | 0.50 | 0.20 | 0.75 | 1 | 4.0 |
| February--- | 29.7 | 10.0 | 19.8 | 57 | -22 | 0 | .65 | .16 | 1.04 | 1 | 8.6 |
| March------ | 41.3 | 22.1 | 31.7 | 77 | -8 | 10 | 2.01 | .93 | 2.93 | 4 | 5.5 |
| April------ | 58.4 | 35.2 | 46.8 | 88 | 14 | 82 | 2.66 | 1.30 | 3.84 | 5 | .6 |
| May-------- | 71.5 | 47.1 | 59.3 | 93 | 26 | 310 | 3.59 | 2.45 | 4.64 | 7 | .0 |
| June------- | 80.8 | 57.2 | 69.0 | 98 | 40 | 570 | 3.89 | 2.22 | 5.38 | 7 | .0 |
| July------- | 84.8 | 61.6 | 73.2 | 99 | 46 | 718 | 4.16 | 1.49 | 6.39 | 6 | .0 |
| August----- | 81.8 | 58.4 | 70.1 | 97 | 42 | 623 | 3.86 | 1.94 | 5.54 | 6 | .0 |
| September-- | 72.9 | 49.0 | 61.0 | 94 | 28 | 342 | 3.30 | 1.37 | 4.94 | 6 | .0 |
| October---- | 61.7 | 37.0 | 49.4 | 86 | 17 | 110 | 1.96 | .69 | 3.01 | 4 | .0 |
| November--- | 42.6 | 23.5 | 33.1 | 69 | -4 | 6 | 1.18 | .31 | 1.88 | 2 | 1.9 |
| December--- | 27.6 | 9.3 | 18.5 | 57 | -20 | 0 | .72 | .28 | 1.09 | 2 | 6.5 |
| Yearly: | | | | | | | | | | | |
| Average--- | 56.5 | 34.6 | 45.5 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme--- | 104 | -33 | --- | 100 | -27 | --- | --- | --- | --- | --- | --- |
| Total----- | --- | --- | --- | --- | --- | 2,773 | 28.50 | 18.96 | 32.06 | 51 | 27.1 |

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Spencer, Iowa)

| Probability | Temperature | | |
|---|---|---|---|
| | 24 °F or lower | 28 °F or lower | 32 °F or lower |
| Last freezing temperature in spring: | | | |
| 1 year in 10 later than-- | Apr. 26 | May 11 | May 16 |
| 2 years in 10 later than-- | Apr. 21 | May 5 | May 11 |
| 5 years in 10 later than-- | Apr. 12 | Apr. 25 | May 2 |
| First freezing temperature in fall: | | | |
| 1 year in 10 earlier than-- | Sept. 28 | Sept. 23 | Sept. 16 |
| 2 years in 10 earlier than-- | Oct. 4 | Sept. 28 | Sept. 21 |
| 5 years in 10 earlier than-- | Oct. 16 | Oct. 8 | Sept. 29 |

Table 3.--Growing Season

(Recorded in the period 1961-90 at Spencer, Iowa)

| Probability | Daily minimum temperature during growing season | | |
|---|---|---|---|
| | Higher than 24 °F | Higher than 28 °F | Higher than 32 °F |
| | Days | Days | Days |
| 9 years in 10 | 164 | 147 | 132 |
| 8 years in 10 | 171 | 153 | 138 |
| 5 years in 10 | 185 | 166 | 150 |
| 2 years in 10 | 199 | 178 | 162 |
| 1 year in 10 | 207 | 185 | 168 |

Table 4.--Acreage and Proportionate Extent of the Soils

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| 6 | Okoboji silty clay loam, depressional, 0 to 1 percent slopes | 3,898 | 1.1 |
| 27B | Terril loam, 2 to 5 percent slopes | 1,748 | 0.5 |
| 27C | Terril loam, 5 to 9 percent slopes | 1,013 | 0.3 |
| 27D | Terril loam, 9 to 14 percent slopes | 277 | * |
| 31 | Afton silty clay loam, 0 to 2 percent slopes | 5,587 | 1.5 |
| 34B | Estherville sandy loam, 2 to 5 percent slopes | 178 | * |
| 41C | Sparta loamy sand, 5 to 9 percent slopes | 790 | 0.2 |
| 48 | Knoke mucky silty clay loam, depressional, 0 to 1 percent slopes | 264 | * |
| 54 | Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded | 1,163 | 0.3 |
| 55 | Nicollet loam, 1 to 3 percent slopes | 13,696 | 3.7 |
| 62F | Storden loam, 18 to 25 percent slopes | 456 | 0.1 |
| 77B | Sac silty clay loam, 2 to 5 percent slopes | 14,108 | 3.9 |
| 77C | Sac silty clay loam, 5 to 9 percent slopes | 480 | 0.1 |
| 77C2 | Sac silty clay loam, 5 to 9 percent slopes, moderately eroded | 1,003 | 0.3 |
| 90 | Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes | 955 | 0.3 |
| 95 | Harps loam, 0 to 2 percent slopes | 1,825 | 0.5 |
| 107 | Webster silty clay loam, 0 to 2 percent slopes | 13,450 | 3.7 |
| 108 | Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes | 15,011 | 4.1 |
| 108B | Wadena loam, 24 to 32 inches to sand and gravel, 2 to 5 percent slopes | 4,700 | 1.3 |
| 133 | Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded | 7,052 | 1.9 |
| 135 | Coland clay loam, 0 to 2 percent slopes, occasionally flooded | 3,182 | 0.9 |
| 138B | Clarion loam, 2 to 5 percent slopes | 23,210 | 6.3 |
| 138C2 | Clarion loam, 5 to 9 percent slopes, moderately eroded | 8,186 | 2.2 |
| 175 | Dickinson fine sandy loam, 0 to 2 percent slopes | 1,945 | 0.5 |
| 175B | Dickinson fine sandy loam, 2 to 5 percent slopes | 498 | 0.1 |
| 191 | Rushmore silty clay loam, 0 to 2 percent slopes | 3,603 | 1.0 |
| 201B | Coland-Terril complex, 1 to 5 percent slopes | 2,926 | 0.8 |
| 202 | Cylinder loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes | 4,809 | 1.3 |
| 203 | Cylinder loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes | 5,705 | 1.6 |
| 221 | Klossner muck, depressional, 0 to 1 percent slopes | 757 | 0.2 |
| 259 | Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes | 8,021 | 2.2 |
| 274 | Rolfe silt loam, depressional, 0 to 1 percent slopes | 117 | * |
| 282 | Ransom silty clay loam, 1 to 3 percent slopes | 12,241 | 3.3 |
| 308 | Wadena loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes | 2,006 | 0.5 |
| 308B | Wadena loam, 32 to 40 inches to sand and gravel, 2 to 5 percent slopes | 770 | 0.2 |
| 354 | Aquolls (marsh), ponded, 0 to 1 percent slopes | 2,337 | 0.6 |
| 375 | Fostoria clay loam, lacustrine substratum, 1 to 3 percent slopes | 1,834 | 0.5 |
| 376F | Cornell silty clay loam, 18 to 25 percent slopes | 665 | 0.2 |
| 379 | Ocheyedan clay loam, lacustrine substratum, 0 to 2 percent slopes | 284 | * |
| 379B | Ocheyedan clay loam, lacustrine substratum, 2 to 5 percent slopes | 994 | 0.3 |
| 379C2 | Ocheyedan clay loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded | 121 | * * |
| 384 | Collinwood clay, 1 to 3 percent slopes | 284 | * |
| 390 | Waldorf silty clay, 0 to 2 percent slopes | 1,692 | 0.5 |
| 397 | Letri clay loam, 0 to 2 percent slopes | 8,951 | 2.4 |
| 433E | Moneta clay loam, 14 to 18 percent slopes | 1,279 | 0.3 |
| 433F | Moneta clay loam, 18 to 25 percent slopes | 2,433 | 0.7 |
| 433G | Moneta clay loam, 25 to 40 percent slopes | 2,997 | 0.8 |
| 455 | Wilmonton clay loam, 1 to 3 percent slopes | 10,101 | 2.8 |
| 456 | Wilmonton silty clay loam, 1 to 3 percent slopes | 4,118 | 1.1 |
| 485 | Spillville loam, 0 to 2 percent slopes, occasionally flooded | 1,035 | 0.3 |
| 506 | Wacousta silty clay loam, depressional, 0 to 1 percent slopes | 345 | * |
| 507 | Canisteo clay loam, 0 to 2 percent slopes | 11,875 | 3.2 |
| 541C | Estherville-Hawick complex, 5 to 9 percent slopes | 1,283 | 0.4 |
| 559 | Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes | 5,859 | 1.6 |
| 577B | Everly clay loam, 2 to 5 percent slopes | 17,348 | 4.7 |
| 577C2 | Everly clay loam, 5 to 9 percent slopes, moderately eroded | 2,944 | 0.8 |
| 637D2 | Everly-Moneta complex, 9 to 14 percent slopes, moderately eroded | 1,508 | 0.4 |

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| 638C2 | Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded | 652 | 0.2 |
| 672 | May City sandy clay loam, 0 to 2 percent slopes | 1,543 | 0.4 |
| 672B | May City sandy clay loam, 2 to 5 percent slopes | 580 | 0.2 |
| 672C2 | May City sandy clay loam, 5 to 9 percent slopes, moderately eroded | 129 | * |
| 709 | Fairhaven silt loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes | 389 | 0.1 |
| 733 | Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded | 1,308 | 0.4 |
| 735 | Havelock clay loam, 0 to 2 percent slopes, occasionally flooded | 102 | * |
| 740D | Hawick gravelly loamy sand, 9 to 14 percent slopes | 519 | 0.1 |
| 810 | Galva silty clay loam, terrace, 0 to 2 percent slopes | 572 | 0.2 |
| 810B | Galva silty clay loam, terrace, 2 to 5 percent slopes | 75 | * |
| 828B | Zenor sandy loam, 2 to 5 percent slopes | 15 | * |
| 828C2 | Zenor sandy loam, 5 to 9 percent slopes, moderately eroded | 6 | * |
| 835D2 | Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded | 2,320 | 0.6 |
| 835E2 | Storden-Omsrud complex, 14 to 18 percent slopes, moderately eroded | 561 | 0.2 |
| 854D | Histosols, fens, 2 to 25 percent slopes | 16 | * |
| 874 | Dickinson sandy loam, lacustrine substratum, 0 to 2 percent slopes | 275 | * |
| 874B | Dickinson sandy loam, lacustrine substratum, 2 to 5 percent slopes | 337 | * |
| 874C2 | Dickinson sandy loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded | 60 | * |
| 875 | Roine fine sandy loam, 0 to 2 percent slopes | 518 | 0.1 |
| 875B | Roine fine sandy loam, 2 to 5 percent slopes | 1,769 | 0.5 |
| 875C2 | Roine fine sandy loam, 5 to 9 percent slopes, moderately eroded | 185 | * |
| 878 | Ocheyedan loam, 0 to 2 percent slopes | 386 | 0.1 |
| 878B | Ocheyedan loam, 2 to 5 percent slopes | 593 | 0.2 |
| 879 | Fostoria loam, 1 to 3 percent slopes | 1,429 | 0.4 |
| 928 | Annieville silty clay loam, 0 to 2 percent slopes | 1,652 | 0.5 |
| 928B | Annieville silty clay loam, 2 to 5 percent slopes | 401 | 0.1 |
| 992 | Gillett Grove silty clay loam, depressional, 0 to 1 percent slopes | 637 | 0.2 |
| 1053 | Belmann clay loam, gypsum phase, 0 to 2 percent slopes | 558 | 0.2 |
| 1091 | McCreath silty clay loam, 0 to 2 percent slopes | 49,134 | 13.4 |
| 1092 | Gillett Grove silty clay loam, 0 to 2 percent slopes | 36,541 | 10.0 |
| 1133 | Colo silty clay loam, channeled, 0 to 2 percent slopes, frequently flooded | 3,574 | 1.0 |
| 1259 | Biscay clay loam, 32 to 40 inches to sand and gravel, depressional, 0 to 1 percent slopes | 794 | 0.2 |
| 1385 | Ocheda silty clay loam, 1 to 3 percent slopes | 979 | 0.3 |
| 1508 | Belmann clay loam, 0 to 2 percent slopes | 2,221 | 0.6 |
| 1585 | Spillville-Coland complex, channeled, 0 to 2 percent slopes, frequently flooded | 5,514 | 1.5 |
| 4000 | Urban land | 172 | * |
| 5010 | Pits, sand and gravel | 631 | 0.2 |
| 5040 | Udorthents, loamy (cut and fill land) | 254 | * |
| 5060 | Pits, clay | 6 | * |
| AW | Animal waste | 2 | * |
| SL | Sewage lagoon | 23 | * |
| W | Water | 3,051 | 0.8 |
| | Total | 366,400 | 100.0 |

* Less than 0.1 percent.

Table 5.--Cropland Management Considerations

(See text for a description of the considerations listed in this table)

| Map symbol and component name | Cropland management considerations |
| --- | --- |
| 6: | |
| Okoboji | Ponding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 27B: | |
| Terril | Potential for surface-water contamination<br>Water erosion |
| 27C: | |
| Terril | Potential for surface-water contamination<br>Water erosion |
| 27D: | |
| Terril | Potential for surface-water contamination<br>Water erosion |
| 31: | |
| Afton | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 34B: | |
| Estherville | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 41C: | |
| Sparta | Excessive permeability<br>Limited available water capacity<br>Limited content of organic matter<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Wind erosion |
| 48: | |
| Knoke | Lime content<br>Ponding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table<br>Wind erosion |
| 54: | |
| Zook | Flooding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 55: | |
| Nicollet | Potential for ground-water contamination<br>Seasonal high water table |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 62F: | |
| Storden | Slope |
| | Lime content |
| | Potential for surface-water contamination |
| | Water erosion |
| | Wind erosion |
| 77B: | |
| Sac | Potential poor tilth and compaction |
| | Potential for surface-water contamination |
| | Water erosion |
| 77C: | |
| Sac | Potential poor tilth and compaction |
| | Potential for surface-water contamination |
| | Water erosion |
| 77C2: | |
| Sac, moderately eroded | Potential poor tilth and compaction |
| | Potential for surface-water contamination |
| | Previously eroded |
| | Water erosion |
| 90: | |
| Okoboji mucky silty clay loam | Ponding |
| | Potential for ground-water contamination |
| | Potential for surface-water contamination |
| | Seasonal high water table |
| 95: | |
| Harps | Lime content |
| | Potential for ground-water contamination |
| | Seasonal high water table |
| | Wind erosion |
| 107: | |
| Webster | Potential poor tilth and compaction |
| | Potential for ground-water contamination |
| | Seasonal high water table |
| 108: | |
| Wadena | Excessive permeability |
| | Limited available water capacity |
| | Potential for ground-water contamination |
| 108B: | |
| Wadena | Excessive permeability |
| | Limited available water capacity |
| | Potential for ground-water contamination |
| 133: | |
| Colo | Flooding |
| | Potential poor tilth and compaction |
| | Potential for ground-water contamination |
| | Potential for surface-water contamination |
| | Seasonal high water table |
| 135: | |
| Coland | Flooding |
| | Potential poor tilth and compaction |
| | Potential for ground-water contamination |
| | Potential for surface-water contamination |
| | Seasonal high water table |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 138B: | |
| Clarion | Potential for surface-water contamination<br>Water erosion |
| 138C2: | |
| Clarion, moderately eroded | Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| 175: | |
| Dickinson | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Wind erosion |
| 175B: | |
| Dickinson | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 191: | |
| Rushmore | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 201B: | |
| Coland | Flooding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| Terril | Potential for surface-water contamination<br>Water erosion |
| 202: | |
| Cylinder, 24 to 32 inches to sand and gravel | Excessive permeability<br>Potential for ground-water contamination<br>Seasonal high water table |
| 203: | |
| Cylinder, 32 to 40 inches to sand and gravel | Excessive permeability<br>Potential for ground-water contamination<br>Seasonal high water table |
| 221: | |
| Klossner | High content of organic matter<br>Ponding<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table<br>Wind erosion |
| 259: | |
| Biscay | Excessive permeability<br>Potential for ground-water contamination<br>Seasonal high water table |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 274: | |
| Rolfe | Ponding<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 282: | |
| Ransom | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 308: | |
| Wadena, 32 to 40 inches to sand and gravel | Excessive permeability<br>Potential for ground-water contamination |
| 308B: | |
| Wadena, 32 to 40 inches to sand and gravel | Excessive permeability<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion |
| 354: | |
| Aquolls (marsh), ponded | Ponding<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 375: | |
| Fostoria, lacustrine substratum | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Restricted permeability<br>Seasonal high water table |
| 376F: | |
| Cornell | Slope<br>Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Water erosion |
| 379: | |
| Ocheyedan, lacustrine substratum | No major considerations |
| 379B: | |
| Ocheyedan, lacustrine substratum | Potential for surface-water contamination<br>Water erosion |
| 379C2: | |
| Ocheyedan, lacustrine substratum, moderately eroded | Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| 384: | |
| Collinwood | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Restricted permeability<br>Seasonal high water table |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 390: | |
| Waldorf | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 397: | |
| Letri | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 433E: | |
| Moneta | Slope<br>Lime content<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 433F: | |
| Moneta | Slope<br>Lime content<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 433G: | |
| Moneta | Slope<br>Lime content<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 455: | |
| Wilmonton | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 456: | |
| Wilmonton | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 485: | |
| Spillville | Flooding<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 506: | |
| Wacousta | Ponding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 507: | |
| Canisteo | Lime content<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table<br>Wind erosion |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 541C: | |
| Estherville | Excessive permeability<br>Limited available water capacity<br>Limited content of organic matter<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| Hawick | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Wind erosion |
| 559: | |
| Talcot | Excessive permeability<br>Lime content<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table<br>Wind erosion |
| 577B: | |
| Everly | Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Water erosion |
| 577C2: | |
| Everly, moderately eroded | Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| 637D2: | |
| Everly, moderately eroded | Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| Moneta, moderately eroded | Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| 638C2: | |
| Clarion, moderately eroded | Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| Storden, moderately eroded | Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 672: | |
| May City | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Wind erosion |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 672B: | |
| May City | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 672C2: | |
| May City, moderately eroded | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 709: | |
| Fairhaven | Excessive permeability<br>Potential for ground-water contamination |
| 733: | |
| Calco | Flooding<br>Lime content<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table<br>Wind erosion |
| 735: | |
| Havelock | Flooding<br>Lime content<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table<br>Wind erosion |
| 740D: | |
| Hawick | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 810: | |
| Galva, terrace | Potential poor tilth and compaction |
| 810B: | |
| Galva, terrace | Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Water erosion |
| 828B: | |
| Zenor | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 828C2: | |
| Zenor, moderately eroded | Excessive permeability<br>Limited available water capacity<br>Limited content of organic matter<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 835D2: | |
| Storden, moderately eroded | Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| Omsrud, moderately eroded | Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 835E2: | |
| Storden, moderately eroded | Slope<br>Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| Omsrud, moderately eroded | Slope<br>Lime content<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 854D: | |
| Histosols, fens | Slope<br>Potential for ground-water contamination<br>Seasonal high water table |
| 874: | |
| Dickinson, lacustrine substratum | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination |
| 874B: | |
| Dickinson, lacustrine substratum | Excessive permeability<br>Limited available water capacity<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
| --- | --- |
| 874C2: | |
| Dickinson, lacustrine substratum, moderately eroded | Excessive permeability<br>Limited available water capacity<br>Limited content of organic matter<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion |
| 875: | |
| Roine | Potential for ground-water contamination<br>Wind erosion |
| 875B: | |
| Roine | Potential for ground-water contamination<br>Potential for surface-water contamination<br>Water erosion<br>Wind erosion |
| 875C2: | |
| Roine, moderately eroded | Potential for ground-water contamination<br>Potential for surface-water contamination<br>Previously eroded<br>Water erosion<br>Wind erosion |
| 878: | |
| Ocheyedan | No major considerations |
| 878B: | |
| Ocheyedan | Potential for surface-water contamination<br>Water erosion |
| 879: | |
| Fostoria | Potential for ground-water contamination<br>Seasonal high water table |
| 928: | |
| Annieville | Potential poor tilth and compaction |
| 928B: | |
| Annieville | Potential poor tilth and compaction<br>Potential for surface-water contamination<br>Water erosion |
| 992: | |
| Gillett Grove | Ponding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 1053: | |
| Belmann, gypsum phase | Potential for ground-water contamination<br>Seasonal high water table |
| 1091: | |
| McCreath | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |

Table 5.--Cropland Management Considerations--Continued

| Map symbol and component name | Cropland management considerations |
|---|---|
| 1092: | |
| Gillett Grove | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Seasonal high water table |
| 1133: | |
| Colo | Flooding<br>Channels<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 1259: | |
| Biscay, depressional | Excessive permeability<br>Ponding<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 1385: | |
| Ocheda | Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Restricted permeability<br>Seasonal high water table |
| 1508: | |
| Belmann | Potential for ground-water contamination<br>Seasonal high water table |
| 1585: | |
| Spillville | Flooding<br>Channels<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| Coland | Flooding<br>Channels<br>Potential poor tilth and compaction<br>Potential for ground-water contamination<br>Potential for surface-water contamination<br>Seasonal high water table |
| 5010: | |
| Pits, sand and gravel | Not applicable |
| 5040: | |
| Udorthents, loamy | Not applicable |
| 5060: | |
| Pits, clay | Not applicable |
| AW: | |
| Animal waste | Not applicable |
| SL: | |
| Sewage lagoon | Not applicable |
| W: | |
| Water | Not applicable |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. See text for an explanation of terms used in this table)

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| 6----------------------- Okoboji | 3w | 55 | Very low | Very low | 109 | 76 | 35 |
| 27B--------------------- Terril | 2e | 75 | Very low | Very low | 133 | 93 | 43 |
| 27C--------------------- Terril | 3e | 61 | Very low | Very low | 128 | 90 | 41 |
| 27D--------------------- Terril | 3e | 52 | Very low | Very low | 119 | 83 | 38 |
| 31---------------------- Afton | 2w | 75 | Low | Low | 135 | 101 | 51 |
| 34B--------------------- Estherville | 3s | 19 | Low | Low | 50 | 35 | 16 |
| 41C--------------------- Sparta | 6s | 5 | Very low | Very low | --- | 32 | --- |
| 48---------------------- Knoke | 3w | 54 | Very low | Very low | 103 | 72 | 33 |
| 54---------------------- Zook | 2w | 68 | Low | Low | 122 | 85 | 39 |
| 55---------------------- Nicollet | 1 | 82 | Very low | High | 142 | 99 | 45 |
| 62F--------------------- Storden | 6e | 11 | Very low | Very low | --- | --- | --- |
| 77B--------------------- Sac | 2e | 71 | Low | Low | 125 | 94 | 47 |
| 77C--------------------- Sac | 3e | 55 | Low | Low | 118 | 88 | 44 |
| 77C2-------------------- Sac, moderately eroded | 3e | 53 | Low | Low | 115 | 86 | 43 |
| 90---------------------- Okoboji mucky silty clay loam | 3w | 57 | Very low | Very low | 113 | 79 | 36 |
| 95---------------------- Harps | 2w | 57 | Very low | Very low | 113 | 79 | 36 |
| 107--------------------- Webster | 2w | 77 | Very low | Very low | 131 | 92 | 42 |
| 108--------------------- Wadena | 2s | 52 | Very low | Very low | 94 | 66 | 30 |
| 108B-------------------- Wadena | 2s | 47 | Very low | Very low | 2 | 63 | 29 |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops--Continued

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| 133---------------------- Colo | 2w | 73 | Very low | Medium | 125 | 93 | 47 |
| 135---------------------- Coland | 2w | 78 | Low | Very low | 124 | 87 | 40 |
| 138B--------------------- Clarion | 2e | 74 | Very low | Very low | 131 | 92 | 42 |
| 138C2-------------------- Clarion, moderately eroded | 3e | 59 | Very low | Very low | 122 | 85 | 39 |
| 175---------------------- Dickinson | 3s | 41 | Very low | Very low | 76 | 53 | 24 |
| 175B--------------------- Dickinson | 3e | 36 | Very low | Very low | 73 | 51 | 23 |
| 191---------------------- Rushmore | 2w | 76 | Low | Low | 137 | 96 | 51 |
| 201B--------------------- | | 51 | Very low | Very low | 122 | 85 | 39 |
| Coland------------------ | 2w | | | | | | |
| Terril------------------ | 2e | | | | | | |
| 202---------------------- Cylinder, 24 to 32 inches to sand and gravel | 2s | 60 | Low | Low | 107 | 75 | 34 |
| 203---------------------- Cylinder, 32 to 40 inches to sand and gravel | 2s | 71 | Very low | Very low | 124 | 87 | 40 |
| 221---------------------- Klossner | 3w | 48 | Very low | Very low | 110 | 77 | 35 |
| 259---------------------- Biscay | 2w | 70 | Very low | Very low | 119 | 83 | 38 |
| 274---------------------- Rolfe | 3w | 48 | Low | High | 95 | 67 | 30 |
| 282---------------------- Ransom | 1 | 81 | Low | Low | 139 | 97 | 52 |
| 308---------------------- Wadena, 32 to 40 inches to sand and gravel | 2s | 65 | Very low | Very low | 109 | 76 | 35 |
| 308B--------------------- Wadena, 32 to 40 inches to sand and gravel | 2e | 60 | Very low | Very low | 102 | 71 | 33 |
| 354---------------------- Aquolls (marsh), ponded | 5w | 5 | --- | --- | --- | --- | --- |
| 375---------------------- Fostoria, lacustrine substratum | 2e | 70 | Low | Low | 124 | 87 | 40 |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops--Continued

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| 376F---------------------<br>Cornell | 6e | 16 | Low | Low | --- | --- | --- |
| 379---------------------<br>Ocheyedan, lacustrine substratum | 2w | 67 | Low | Low | 118 | 83 | 38 |
| 379B--------------------<br>Ocheyedan, lacustrine substratum | 2e | 62 | Low | Low | 117 | 82 | 37 |
| 379C2-------------------<br>Ocheyedan, lacustrine substratum, moderately eroded | 3e | 47 | Low | Low | 97 | 68 | 31 |
| 384---------------------<br>Collinwood | 2e | 67 | Low | Low | 114 | 80 | 36 |
| 390---------------------<br>Waldorf | 2w | 63 | Low | Low | 101 | 62 | 32 |
| 397---------------------<br>Letri | 2w | 72 | Low | Low | 137 | 96 | 44 |
| 433E--------------------<br>Moneta | 4e | 25 | Low | Low | 71 | 50 | 23 |
| 433F--------------------<br>Moneta | 6e | 5 | Low | Low | --- | --- | --- |
| 433G--------------------<br>Moneta | 7e | 5 | Low | Low | --- | --- | --- |
| 455---------------------<br>Wilmonton | 1 | 74 | Low | Low | 128 | 90 | 41 |
| 456---------------------<br>Wilmonton | 1 | 75 | Low | Low | 130 | 91 | 42 |
| 485---------------------<br>Spillville | 2w | 75 | Very low | Very low | 135 | 95 | 43 |
| 506---------------------<br>Wacousta | 3w | 69 | Low | Low | 113 | 79 | 36 |
| 507---------------------<br>Canisteo | 2w | 73 | Very low | Very low | 127 | 89 | 41 |
| 541C--------------------- | | 5 | Low | Low | 50 | 35 | 16 |
| Estherville------------- | 3s | | | | | | |
| Hawick------------------ | 4s | | | | | | |
| 559---------------------<br>Talcot | 2w | 65 | Low | Low | 113 | 79 | 36 |
| 577B--------------------<br>Everly | 2e | 68 | Low | Low | 127 | 89 | 41 |
| 577C2-------------------<br>Everly, moderately eroded | 3e | 51 | Low | Low | 115 | 81 | 37 |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops--Continued

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| 637D2: Everly-Moneta | 3e | 37 | Low | Low | 98 | 69 | 31 |
| 638C2: Clarion-Storden | 3e | 55 | Very low | Very low | 123 | 86 | 39 |
| 672: May City | 4s | 38 | Low | Low | 52 | 31 | 17 |
| 672B: May City | 3s | 33 | Low | Low | 49 | 29 | 16 |
| 672C2: May City, moderately eroded | 3s | 18 | Low | Low | 44 | 26 | 13 |
| 709: Fairhaven | 1 | 63 | Low | Low | 106 | 80 | 40 |
| 733: Calco | 2w | 68 | Low | Low | 116 | 87 | 44 |
| 735: Havelock | 2w | 68 | Low | Low | 116 | 81 | 37 |
| 740D: Hawick | 4s | 5 | Low | Low | --- | --- | --- |
| 810: Galva, terrace | 1 | 78 | Low | Low | 132 | 99 | 50 |
| 810B: Galva, terrace | 2e | 73 | Low | Low | 129 | 97 | 48 |
| 828B: Zenor | 3e | 45 | Very low | Very low | 89 | 62 | 28 |
| 828C2: Zenor, moderately eroded | 3e | 30 | Very low | Very low | 81 | 57 | 26 |
| 835D2: Storden-Omsrud | 3e | 46 | Low | Low | 120 | 84 | 38 |
| 835E2: Storden-Omsrud | 4e | 36 | Low | Low | 106 | 74 | 34 |
| 854D: Histosols, fens | 5w | 5 | --- | --- | --- | --- | --- |
| 874: Dickinson, lacustrine substratum | 1 | 46 | Low | Low | 120 | 84 | 38 |
| 874B: Dickinson, lacustrine substratum | 2e | 41 | Low | Low | 116 | 81 | 37 |
| 874C2: Dickinson, lacustrine substratum, moderately eroded | 3e | 21 | Low | Low | 110 | 77 | 35 |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops--Continued

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| 875---------------------- Roine | 3s | 46 | Low | Low | 119 | 83 | 38 |
| 875B--------------------- Roine | 3e | 41 | Low | Low | 116 | 81 | 37 |
| 875C2-------------------- Roine, moderately eroded | 3e | 21 | Low | Low | 108 | 75 | 35 |
| 878---------------------- Ocheyedan | 1 | 69 | Low | Low | 122 | 85 | 37 |
| 878B--------------------- Ocheyedan | 2e | 63 | Low | Low | 119 | 83 | 38 |
| 879---------------------- Fostoria | 1 | 72 | Low | Low | 128 | 90 | 41 |
| 928---------------------- Annieville | 1 | 78 | Low | Low | 137 | 96 | 51 |
| 928B--------------------- Annieville | 2e | 73 | Low | Low | 134 | 94 | 50 |
| 992---------------------- Gillett Grove | 3w | 58 | Low | Low | 115 | 81 | 37 |
| 1053--------------------- Belmann, gypsum phase | 2e | 69 | Low | Low | 120 | 85 | 40 |
| 1091--------------------- McCreath | 1 | 83 | Low | Low | 145 | 102 | 54 |
| 1092--------------------- Gillett Grove | 2w | 78 | Low | Low | 140 | 98 | 53 |
| 1133--------------------- Colo | 5w | 25 | Low | Low | --- | --- | --- |
| 1259--------------------- Biscay, depressional | 3w | 49 | Low | Low | 103 | 72 | 33 |
| 1385--------------------- Ocheda | 2w | 73 | | | 120 | 90 | 45 |
| 1508--------------------- Belmann | 2e | 64 | Low | Low | 120 | 84 | 45 |
| 1585--------------------- Spillville-Coland | 5w | 25 | Very low | Very low | --- | --- | --- |
| 4000. Urban land | | | | | | | |
| 5010--------------------- Pits, sand and gravel | 6s | --- | --- | --- | --- | --- | --- |
| 5040. Udorthents, loamy | | | | | | | |
| 5060. Pits, clay | | | | | | | |

Table 6.--Land Capability, Corn Suitability Rating, Subsoil Nutrients, and Yields per Acre of Crops--Continued

| Map symbol and component name | Land capability | Corn suitability rating | Subsoil phosphorus | Subsoil potassium | Corn | Oats | Soybeans |
|---|---|---|---|---|---|---|---|
| | | | | | Bu | Bu | Bu |
| AW. | | | | | | | |
| Animal waste | | | | | | | |
| SL. | | | | | | | |
| Sewage lagoon | | | | | | | |
| W. | | | | | | | |
| Water | | | | | | | |

Table 7.--Land Capability and Yields per Acre of Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 6----------------------- Okoboji | 3w | 3.3 | 2.7 | 4.5 |
| 27B--------------------- Terril | 2e | 5.6 | 3.3 | 5.5 |
| 27C--------------------- Terril | 3e | 5.4 | 3.2 | 5.3 |
| 27D--------------------- Terril | 3e | 5.0 | 2.9 | 4.9 |
| 31---------------------- Afton | 2w | 4.1 | 3.3 | 5.5 |
| 34B--------------------- Estherville | 3s | 1.7 | 1.0 | 1.7 |
| 41C--------------------- Sparta | 6s | 1.9 | 0.6 | 1.1 |
| 48---------------------- Knoke | 3w | 3.1 | 2.5 | 4.2 |
| 54---------------------- Zook | 2w | 3.7 | 3.0 | 5.0 |
| 55---------------------- Nicollet | 1 | 5.7 | 3.5 | 5.8 |
| 62F--------------------- Storden | 6e | --- | 1.8 | 3.1 |
| 77B--------------------- Sac | 2e | 5.3 | 3.1 | 4.9 |
| 77C--------------------- Sac | 3e | 4.9 | 2.9 | 4.9 |
| 77C2-------------------- Sac, moderately eroded | 3e | 4.8 | 2.8 | 4.7 |
| 90---------------------- Okoboji mucky silty clay loam | 3w | 3.4 | 2.8 | 4.6 |
| 95---------------------- Harps | 2w | 3.4 | 2.8 | 4.6 |
| 107--------------------- Webster | 2w | 3.9 | 3.2 | 5.4 |

See footnote at end of table.

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 108--------------------- Wadena | 2s | 3.9 | 2.3 | 3.9 |
| 108B-------------------- Wadena | 2s | 3.7 | 2.1 | 3.6 |
| 133--------------------- Colo | 2w | 3.8 | 3.1 | 5.1 |
| 135--------------------- Coland | 2w | 3.7 | 3.1 | 5.1 |
| 138B-------------------- Clarion | 2e | 5.5 | 3.2 | 5.4 |
| 138C2------------------- Clarion, moderately eroded | 3e | 5.1 | 3.0 | 5.0 |
| 175--------------------- Dickinson | 3s | 3.2 | 1.9 | 3.1 |
| 175B-------------------- Dickinson | 3e | 3.1 | 1.8 | 3.0 |
| 191--------------------- Rushmore | 2w | 4.1 | 3.4 | 5.6 |
| 201B-------------------- | | 3.0 | 3.0 | 5.0 |
| Coland------------------ | 2w | | | |
| Terril------------------ | 2e | | | |
| 202--------------------- Cylinder, 24 to 32 inches to sand and gravel | 2s | 4.4 | 2.7 | 4.5 |
| 203--------------------- Cylinder, 32 to 40 inches to sand and gravel | 2s | 4.9 | 3.0 | 5.0 |
| 221--------------------- Klossner | 3w | 3.3 | 2.7 | 4.5 |
| 259--------------------- Biscay | 2w | 3.6 | 2.9 | 4.9 |
| 274--------------------- Rolfe | 3w | 2.8 | 2.4 | 4.0 |
| 282--------------------- Ransom | 1 | 5.6 | 3.4 | 5.6 |
| 308--------------------- Wadena, 32 to 40 inches to sand and gravel | 2s | 4.6 | 2.7 | 4.5 |
| 308B-------------------- Wadena, 32 to 40 inches to sand and gravel | 2e | 4.3 | 2.6 | 4.2 |

See footnote at end of table.

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 354---------------------- | 5w | --- | --- | --- |
| Aquolls (marsh), ponded | | | | |
| 375---------------------- | 2e | 4.9 | 2.6 | 4.8 |
| Fostoria, lacustrine substratum | | | | |
| 376F--------------------- | 6e | --- | 2.0 | 3.4 |
| Cornell | | | | |
| 379---------------------- | 2w | 4.9 | 2.6 | 4.8 |
| Ocheyedan, lacustrine substratum | | | | |
| 379B--------------------- | 2e | 4.7 | 2.5 | 4.6 |
| Ocheyedan, lacustrine substratum | | | | |
| 379C2-------------------- | 3e | 4.5 | 2.3 | 4.4 |
| Ocheyedan, lacustrine substratum, moderately eroded | | | | |
| 384---------------------- | 2e | 4.5 | 2.7 | 4.7 |
| Collinwood | | | | |
| 390---------------------- | 2w | 3.0 | 2.5 | 4.1 |
| Waldorf | | | | |
| 397---------------------- | 2w | 4.1 | 3.3 | 5.6 |
| Letri | | | | |
| 433E--------------------- | 4e | 3.0 | 2.2 | 3.6 |
| Moneta | | | | |
| 433F--------------------- | 6e | 2.5 | 2.0 | 2.0 |
| Moneta | | | | |
| 433G--------------------- | 7e | --- | 1.5 | --- |
| Moneta | | | | |
| 455---------------------- | 1 | 5.1 | 3.4 | 5.3 |
| Wilmonton | | | | |
| 456---------------------- | 1 | 5.1 | 3.4 | 5.3 |
| Wilmonton | | | | |
| 485---------------------- | 2w | 5.4 | 3.4 | 5.5 |
| Spillville | | | | |
| 506---------------------- | 3w | 3.5 | 2.9 | 4.8 |
| Wacousta | | | | |
| 507---------------------- | 2w | 3.8 | 3.1 | 5.2 |
| Canisteo | | | | |
| 541C--------------------- | | 2.2 | 1.4 | 2.3 |
| Estherville------------- | 3s | | | |
| Hawick------------------ | 4s | | | |

See footnote at end of table.

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 559-----------------------<br>Talcot | 2w | 3.4 | 2.8 | 4.6 |
| 577B----------------------<br>Everly | 2e | 5.3 | 2.7 | 3.2 |
| 577C2---------------------<br>Everly, moderately eroded | 3e | 4.7 | 2.7 | 4.6 |
| 637D2---------------------<br>Everly-Moneta | 3e | 4.3 | 2.5 | 4.2 |
| 638C2---------------------<br>Clarion-Storden | 3e | 4.9 | 3.0 | 4.7 |
| 672-----------------------<br>May City | 4s | 2.2 | 1.3 | 2.2 |
| 672B----------------------<br>May City | 3s | 2.1 | 1.2 | 2.0 |
| 672C2---------------------<br>May City, moderately eroded | 3s | 1.8 | 1.1 | 1.8 |
| 709-----------------------<br>Fairhaven | 1 | 4.6 | 2.7 | 4.5 |
| 733-----------------------<br>Calco | 2w | 3.4 | 2.8 | 4.7 |
| 735-----------------------<br>Havelock | 2w | 3.4 | 2.8 | 4.7 |
| 740D----------------------<br>Hawick | 4s | 1.7 | 1.2 | 2.0 |
| 810-----------------------<br>Galva, terrace | 1 | 5.5 | 3.7 | 5.8 |
| 810B----------------------<br>Galva, terrace | 2e | 5.4 | 3.7 | 5.7 |
| 828B----------------------<br>Zenor | 3e | 3.7 | 2.2 | 3.6 |
| 828C2---------------------<br>Zenor, moderately eroded | 3e | 3.4 | 2.0 | 3.3 |
| 835D2---------------------<br>Storden-Omsrud | 3e | 5.0 | 3.0 | 4.9 |
| 835E2---------------------<br>Storden-Omsrud | 4e | 4.2 | 2.5 | 4.1 |
| 854D----------------------<br>Histosols, fens | 5w | --- | --- | --- |

See footnote at end of table.

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 874-----------------------Dickinson, lacustrine substratum | 1 | 4.7 | 3.7 | 4.5 |
| 874B----------------------Dickinson, lacustrine substratum | 2e | 4.9 | 3.7 | 4.4 |
| 874C2---------------------Dickinson, lacustrine substratum, moderately eroded | 3e | 4.2 | 3.3 | 4.2 |
| 875-----------------------Roine | 3s | 5.0 | 2.9 | 4.9 |
| 875B----------------------Roine | 3e | 4.9 | 2.9 | 4.8 |
| 875C2---------------------Roine, moderately eroded | 3e | 4.5 | 2.7 | 4.4 |
| 878-----------------------Ocheyedan | 1 | 5.1 | 2.7 | 5.0 |
| 878B----------------------Ocheyedan | 2e | 5.0 | 2.6 | 4.9 |
| 879-----------------------Fostoria | 1 | 5.1 | 3.2 | 5.3 |
| 928-----------------------Annieville | 1 | 5.7 | 3.2 | 5.6 |
| 928B----------------------Annieville | 2e | 5.6 | 3.1 | 6.5 |
| 992-----------------------Gillett Grove | 3w | 3.5 | 2.8 | 4.7 |
| 1053----------------------Belmann, gypsum phase | 2e | 4.7 | 3.7 | 6.2 |
| 1091----------------------McCreath | 1 | 5.8 | 3.6 | 5.9 |
| 1092----------------------Gillett Grove | 2w | 4.2 | 3.4 | 5.7 |
| 1133----------------------Colo | 5w | --- | 2.0 | --- |
| 1259----------------------Biscay, depressional | 3w | 3.1 | 2.6 | 4.3 |
| 1385----------------------Ocheda | 2w | 4.6 | 2.7 | 4.5 |
| 1508----------------------Belmann | 2e | 3.6 | 2.8 | 4.7 |

See footnote at end of table.

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

| Map symbol and component name | Land capability | Bromegrass-alfalfa hay | Kentucky bluegrass | Smooth bromegrass |
|---|---|---|---|---|
| | | Tons | AUM* | AUM* |
| 1585: Spillville-Coland | 5w | --- | 2.9 | --- |
| 5010: Pits, sand and gravel | 6s | --- | --- | --- |
| 5040. Udorthents, loamy | | | | |
| 5060. Pits, clay | | | | |
| AW. Animal waste | | | | |
| SL. Sewage lagoon | | | | |
| W. Water | | | | |

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five goats, or five sheep) for 30 days.

Table 8.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

| Map symbol | Soil name |
|---|---|
| 27B | Terril loam, 2 to 5 percent slopes |
| 31 | Afton silty clay loam, 0 to 2 percent slopes (where drained) |
| 54 | Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season) |
| 55 | Nicollet loam, 1 to 3 percent slopes |
| 77B | Sac silty clay loam, 2 to 5 percent slopes |
| 95 | Harps loam, 0 to 2 percent slopes (where drained) |
| 107 | Webster silty clay loam, 0 to 2 percent slopes (where drained) |
| 108 | Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes |
| 108B | Wadena loam, 24 to 32 inches to sand and gravel, 2 to 5 percent slopes |
| 133 | Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season) |
| 135 | Coland clay loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season) |
| 138B | Clarion loam, 2 to 5 percent slopes |
| 175 | Dickinson fine sandy loam, 0 to 2 percent slopes |
| 175B | Dickinson fine sandy loam, 2 to 5 percent slopes |
| 191 | Rushmore silty clay loam, 0 to 2 percent slopes (where drained) |
| 201B | Coland-Terril complex, 1 to 5 percent slopes (where drained) |
| 202 | Cylinder loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes |
| 203 | Cylinder loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 259 | Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes (where drained) |
| 282 | Ransom silty clay loam, 1 to 3 percent slopes |
| 308 | Wadena loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 308B | Wadena loam, 32 to 40 inches to sand and gravel, 2 to 5 percent slopes |
| 375 | Fostoria clay loam, lacustrine substratum, 1 to 3 percent slopes |
| 379 | Ocheyedan clay loam, lacustrine substratum, 0 to 2 percent slopes |
| 379B | Ocheyedan clay loam, lacustrine substratum, 2 to 5 percent slopes |
| 384 | Collinwood clay, 1 to 3 percent slopes |
| 390 | Waldorf silty clay, 0 to 2 percent slopes (where drained) |
| 397 | Letri clay loam, 0 to 2 percent slopes (where drained) |
| 455 | Wilmonton clay loam, 1 to 3 percent slopes |
| 456 | Wilmonton silty clay loam, 1 to 3 percent slopes |
| 485 | Spillville loam, 0 to 2 percent slopes, occasionally flooded (where protected from flooding or not frequently flooded during the growing season) |
| 507 | Canisteo clay loam, 0 to 2 percent slopes (where drained) |
| 559 | Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes (where drained) |
| 577B | Everly clay loam, 2 to 5 percent slopes |
| 709 | Fairhaven silt loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 733 | Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season) |
| 735 | Havelock clay loam, 0 to 2 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season) |
| 810 | Galva silty clay loam, terrace, 0 to 2 percent slopes |
| 810B | Galva silty clay loam, terrace, 2 to 5 percent slopes |
| 874 | Dickinson sandy loam, lacustrine substratum, 0 to 2 percent slopes |
| 874B | Dickinson sandy loam, lacustrine substratum, 2 to 5 percent slopes |
| 875 | Roine fine sandy loam, 0 to 2 percent slopes |
| 875B | Roine fine sandy loam, 2 to 5 percent slopes |
| 878 | Ocheyedan loam, 0 to 2 percent slopes |
| 878B | Ocheyedan loam, 2 to 5 percent slopes |
| 879 | Fostoria loam, 1 to 3 percent slopes |
| 928 | Annieville silty clay loam, 0 to 2 percent slopes |
| 928B | Annieville silty clay loam, 2 to 5 percent slopes |
| 1053 | Belmann clay loam, gypsum phase, 0 to 2 percent slopes (where drained) |
| 1091 | McCreath silty clay loam, 0 to 2 percent slopes |
| 1092 | Gillett Grove silty clay loam, 0 to 2 percent slopes (where drained) |
| 1385 | Ocheda silty clay loam, 1 to 3 percent slopes |
| 1508 | Belmann clay loam, 0 to 2 percent slopes (where drained) |

Table 9.--Windbreaks and Environmental Plantings

(Only the soils that are suitable for windbreaks and environmental plantings are listed. Absence of an entry indicates that trees generally do not grow to the given height)

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 6: | | | | | |
| Okoboji | Redosier dogwood | --- | Black ash, tall purple willow | Black willow, golden willow, white willow | --- |
| 27B: | | | | | |
| Terril | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, green ash, honeylocust, eastern white pine | --- |
| 27C: | | | | | |
| Terril | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, honeylocust, eastern white pine, green ash | --- |
| 27D: | | | | | |
| Terril | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, honeylocust, eastern white pine, green ash | --- |
| 31: | | | | | |
| Afton | Siberian peashrub, common lilac | --- | Eastern redcedar, Russian-olive, blue spruce, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust | Eastern cottonwood |
| 34B: | | | | | |
| Estherville | Siberian peashrub, common lilac | Eastern redcedar | Russian-olive, jack pine, red pine, Austrian pine, Siberian elm, green ash, honeylocust | Eastern white pine | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 41C: | | | | | |
| Sparta | Siberian peashrub, common lilac | --- | Russian-olive, eastern redcedar, jack pine, red pine, Austrian pine, Siberian elm, green ash, honeylocust | Eastern white pine | --- |
| 48: | | | | | |
| Knoke | --- | Siberian peashrub, common lilac, cotoneaster, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 54: | | | | | |
| Zook | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, white fir, eastern arborvitae, Austrian pine | Norway spruce, eastern white pine | Pin oak |
| 55: | | | | | |
| Nicollet | --- | Common lilac, redosier dogwood | Eastern arborvitae, white spruce, Amur maple, blue spruce | Austrian pine, eastern white pine, common hackberry, green ash | Silver maple |
| 62F: | | | | | |
| Storden | American plum, Siberian peashrub | Common hackberry, eastern redcedar | Russian-olive, green ash, honeylocust | Siberian elm | --- |
| 77B: | | | | | |
| Sac | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 77C: | | | | | |
| Sac | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 77C2: | | | | | |
| Sac, moderately eroded | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 90: | | | | | |
| Okoboji mucky silty clay loam | Redosier dogwood | --- | Black ash, tall purple willow | Black willow, golden willow, white willow | --- |
| 95: | | | | | |
| Harps | --- | Siberian peashrub, common lilac, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 107: | | | | | |
| Webster | --- | American plum, cotoneaster, redosier dogwood | Amur maple, eastern arborvitae, white spruce, common hackberry, tall purple willow | Golden willow | Green ash, silver maple, eastern cottonwood |
| 108: | | | | | |
| Wadena | Siberian peashrub, common lilac | Eastern redcedar | Manchurian crabapple, Russian-olive, bur oak, common hackberry, green ash, eastern white pine, jack pine | --- | --- |
| 108B: | | | | | |
| Wadena | Siberian peashrub, common lilac | Eastern redcedar | Manchurian crabapple, Russian-olive, bur oak, common hackberry, green ash, eastern white pine, jack pine | --- | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 133: | | | | | |
| Colo | --- | American plum | Amur maple, redosier dogwood, white fir, white spruce, common hackberry, tall purple willow | Golden willow | Green ash, silver maple, eastern cottonwood |
| 135: | | | | | |
| Coland | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, white fir, eastern arborvitae, Austrian pine | Norway spruce, eastern white pine | Pin oak |
| 138B: | | | | | |
| Clarion | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, common hackberry, green ash, eastern white pine | --- |
| 138C2: | | | | | |
| Clarion, moderately eroded | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, common hackberry, green ash, eastern white pine | --- |
| 175: | | | | | |
| Dickinson | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 175B: | | | | | |
| Dickinson | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 191: | | | | | |
| Rushmore | Siberian peashrub, common lilac | --- | Eastern redcedar, blue spruce, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust, silver maple | Eastern cottonwood |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 201B: | | | | | |
| Coland | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, white fir, eastern arborvitae, Austrian pine | Norway spruce, eastern white pine | Pin oak |
| Terril | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, green ash, honeylocust, eastern white pine | --- |
| 202: | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | --- | Common lilac, redosier dogwood | Eastern arborvitae, white spruce, Amur maple, blue spruce | Austrian pine, eastern white pine, common hackberry, green ash | Silver maple |
| 203: | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | --- | Common lilac, redosier dogwood | Eastern arborvitae, white spruce, Amur maple, blue spruce | Austrian pine, eastern white pine, common hackberry, green ash | Silver maple |
| 221: | | | | | |
| Klossner | Common ninebark, silky dogwood, whitebelle honeysuckle | Amur honeysuckle, Amur privet, nannyberry | Tall purple willow | Black willow, golden willow | Imperial Carolina poplar |
| 259: | | | | | |
| Biscay | --- | American plum, cotoneaster, redosier dogwood | Amur maple, eastern arborvitae, white spruce, common hackberry, tall purple willow | Golden willow | Green ash, silver maple, eastern cottonwood |
| 274: | | | | | |
| Rolfe | --- | American plum, redosier dogwood | Amur maple, eastern arborvitae, white spruce, common hackberry, tall purple willow | Golden willow | Green ash, silver maple, eastern cottonwood |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 282: | | | | | |
| Ransom | Peking cotoneaster | American plum, Siberian peashrub, common lilac | Manchurian crabapple, eastern redcedar, ponderosa pine | Common hackberry, green ash, honeylocust, golden willow | Eastern cottonwood |
| 308: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Siberian peashrub, common lilac | Manchurian crabapple, Russian-olive, common hackberry, eastern redcedar | Bur oak, green ash, eastern white pine, jack pine | --- | --- |
| 308B: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Siberian peashrub, common lilac | Manchurian crabapple, Russian-olive, common hackberry, eastern redcedar | Bur oak, green ash, eastern white pine, jack pine | --- | --- |
| 375: | | | | | |
| Fostoria, lacustrine substratum | --- | Common lilac, redosier dogwood | Eastern arborvitae, white spruce, Amur maple, blue spruce | Austrian pine, eastern white pine, common hackberry, green ash | Silver maple |
| 376F: | | | | | |
| Cornell | Amur honeysuckle, common lilac | Amur maple, autumn-olive | Russian-olive, bur oak, common hackberry, eastern redcedar | Austrian pine, eastern white pine, green ash, honeylocust | --- |
| 379: | | | | | |
| Ocheyedan, lacustrine substratum | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 379B: | | | | | |
| Ocheyedan, lacustrine substratum | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 379C2: | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 384: | | | | | |
| Collinwood | --- | Siberian peashrub, common lilac, cotoneaster, eastern arborvitae | Bur oak, eastern redcedar, white spruce, Austrian pine, Russian-olive, common hackberry | Eastern white pine, green ash | --- |
| 390: | | | | | |
| Waldorf | --- | Redosier dogwood | American plum, Amur maple, eastern arborvitae, white spruce, common hackberry, tall purple willow | --- | Golden willow, green ash, silver maple, eastern cottonwood |
| 397: | | | | | |
| Letri | Siberian peashrub, common lilac | --- | Eastern redcedar, blue spruce, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust, silver maple | Eastern cottonwood |
| 433E: | | | | | |
| Moneta | American plum, Siberian peashrub | --- | Russian-olive, common hackberry, eastern redcedar, green ash, honeylocust | Siberian elm | --- |
| 433F: | | | | | |
| Moneta | American plum, Siberian peashrub | --- | Russian-olive, common hackberry, eastern redcedar, green ash, honeylocust | Siberian elm | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 433G: | | | | | |
| Moneta | American plum, Siberian peashrub | --- | Russian-olive, common hackberry, eastern redcedar, green ash, honeylocust | Siberian elm | --- |
| 455: | | | | | |
| Wilmonton | Peking cotoneaster | American plum, Siberian peashrub, common lilac | Manchurian crabapple, eastern redcedar, ponderosa pine | Common hackberry, green ash, honeylocust, golden willow | Eastern cottonwood |
| 456: | | | | | |
| Wilmonton | Peking cotoneaster | American plum, Siberian peashrub, common lilac | Manchurian crabapple, eastern redcedar, ponderosa pine | Common hackberry, green ash, honeylocust, golden willow | Eastern cottonwood |
| 485: | | | | | |
| Spillville | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, eastern arborvitae, white fir | Austrian pine, Norway spruce | Pin oak, eastern white pine |
| 506: | | | | | |
| Wacousta | --- | Siberian peashrub, common lilac, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 507: | | | | | |
| Canisteo | --- | Cotoneaster, Washington hawthorn, nannyberry | White spruce, eastern arborvitae, eastern redcedar, green ash, osageorange | Black willow | --- |
| 541C: | | | | | |
| Estherville | Siberian peashrub, common lilac | Eastern redcedar | Russian-olive, jack pine, red pine, Austrian pine, Siberian elm, green ash, honeylocust | Eastern white pine | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 541C: | | | | | |
| Hawick | Siberian peashrub, honeysuckle, late lilac | --- | Austrian pine, Russian-olive, eastern redcedar, green ash, jack pine, thornless honeylocust | Siberian elm, eastern white pine, red pine | --- |
| 559: | | | | | |
| Talcot | Siberian peashrub, common lilac | --- | Eastern redcedar, Russian-olive, blue spruce, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust | Eastern cottonwood |
| 577B: | | | | | |
| Everly | Common lilac | American plum, Siberian peashrub, cotoneaster | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 577C2: | | | | | |
| Everly, moderately eroded | Common lilac | American plum, Siberian peashrub, cotoneaster | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 637D2: | | | | | |
| Everly, moderately eroded | Common lilac | American plum, Siberian peashrub, cotoneaster | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| Moneta, moderately eroded | Common lilac | American plum, Siberian peashrub, cotoneaster | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 638C2: | | | | | |
| Clarion, moderately eroded | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, common hackberry, green ash, eastern white pine | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 638C2: | | | | | |
| Storden, moderately eroded | American plum, Siberian peashrub | Common hackberry, eastern redcedar | Russian-olive, green ash, honeylocust | Siberian elm | --- |
| 672: | | | | | |
| May City | Siberian peashrub, gray dogwood, manyflower cotoneaster, silky dogwood | American cranberrybush, Amur maple, common lilac, eastern redcedar | Norway spruce | Eastern white pine, jack pine, red pine | --- |
| 672B: | | | | | |
| May City | Siberian peashrub, gray dogwood, manyflower cotoneaster, silky dogwood | American cranberrybush, Amur maple, common lilac, eastern redcedar | Norway spruce | Eastern white pine, jack pine, red pine | --- |
| 672C2: | | | | | |
| May City, moderately eroded | Siberian peashrub, gray dogwood, manyflower cotoneaster, silky dogwood | American cranberrybush, Amur maple, common lilac, eastern redcedar | Norway spruce | Eastern white pine, jack pine, red pine | --- |
| 733: | | | | | |
| Calco | Amur honeysuckle, Siberian peashrub, common lilac | --- | Eastern redcedar, Russian-olive, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust | Eastern cottonwood |
| 735: | | | | | |
| Havelock | --- | Siberian peashrub, common lilac, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 740D: | | | | | |
| Hawick | Siberian peashrub, honeysuckle, late lilac | --- | Austrian pine, Russian-olive, eastern redcedar, green ash, jack pine, thornless honeylocust | Siberian elm, eastern white pine, red pine | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 810: | | | | | |
| Galva, terrace | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 810B: | | | | | |
| Galva, terrace | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 828B: | | | | | |
| Zenor | Siberian peashrub, common lilac | Manchurian crabapple, common hackberry, eastern redcedar | Russian-olive, bur oak, green ash, eastern white pine, jack pine, honeylocust | --- | --- |
| 828C2: | | | | | |
| Zenor, moderately eroded | Siberian peashrub, common lilac | Manchurian crabapple, common hackberry, eastern redcedar | Russian-olive, bur oak, green ash, eastern white pine, jack pine, honeylocust | --- | --- |
| 835D2: | | | | | |
| Storden, moderately eroded | American plum, Siberian peashrub | Common hackberry, eastern redcedar | Russian-olive, green ash, honeylocust | Siberian elm | --- |
| Omsrud, moderately eroded | --- | Siberian peashrub, common lilac, gray dogwood, redosier dogwood | Eastern arborvitae, eastern redcedar, Amur maple, blue spruce | Russian-olive, common hackberry, green ash, eastern white pine | --- |
| 835E2: | | | | | |
| Storden, moderately eroded | American plum, Siberian peashrub | --- | Russian-olive, common hackberry, eastern redcedar, green ash, honeylocust | Siberian elm | --- |
| Omsrud, moderately eroded | American plum, Siberian peashrub | Common hackberry, eastern redcedar | Russian-olive, green ash, honeylocust | Siberian elm | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- <8 | 8-15 | 16-25 | 26-35 | >35 |
|---|---|---|---|---|---|
| 874: | | | | | |
| Dickinson, lacustrine substratum | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 874B: | | | | | |
| Dickinson, lacustrine substratum | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 874C2: | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 875: | | | | | |
| Roine | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 875B: | | | | | |
| Roine | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 875C2: | | | | | |
| Roine, moderately eroded | Common lilac | Siberian peashrub, Russian-olive, eastern redcedar | Amur maple, common hackberry, red pine, eastern white pine, green ash | Norway spruce, honeylocust | --- |
| 878: | | | | | |
| Ocheyedan | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 878B: | | | | | |
| Ocheyedan | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 879: | | | | | |
| Fostoria | --- | Common lilac, redosier dogwood | Eastern arborvitae, white spruce, Amur maple, blue spruce | Austrian pine, eastern white pine, common hackberry, green ash | Silver maple |
| 928: | | | | | |
| Annieville | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 928B: | | | | | |
| Annieville | Common lilac | American plum, Siberian peashrub | Bur oak, eastern redcedar, Russian-olive, blue spruce, common hackberry | Green ash, ponderosa pine, honeylocust | --- |
| 992: | | | | | |
| Gillett Grove | Redosier dogwood | --- | Black ash, tall purple willow | Black willow, golden willow, white willow | --- |
| 1053: | | | | | |
| Belmann, gypsum phase | --- | Siberian peashrub, common lilac, cotoneaster, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 1091: | | | | | |
| McCreath | Peking cotoneaster | American plum, Siberian peashrub, common lilac | Manchurian crabapple, eastern redcedar, ponderosa pine | Common hackberry, golden willow, green ash, honeylocust | Eastern cottonwood |
| 1092: | | | | | |
| Gillett Grove | Siberian peashrub, common lilac | --- | Eastern redcedar, blue spruce, common hackberry, ponderosa pine | Golden willow, green ash, honeylocust, silver maple | Eastern cottonwood |

Table 9.--Windbreaks and Environmental Plantings--Continued

| Map symbol and component name | Trees having predicted 20-year average height, in feet, of-- | | | | |
|---|---|---|---|---|---|
| | <8 | 8-15 | 16-25 | 26-35 | >35 |
| 1259: | | | | | |
| Biscay, depressional | Redosier dogwood | --- | Black ash, tall purple willow | Black willow, golden willow, white willow | --- |
| 1385: | | | | | |
| Ocheda | --- | Siberian peashrub, common lilac, cotoneaster, eastern arborvitae, eastern redcedar | Bur oak, white spruce, Austrian pine, Russian-olive, common hackberry | Eastern white pine, green ash | --- |
| 1508: | | | | | |
| Belmann | --- | Siberian peashrub, common lilac, cotoneaster, eastern arborvitae | Eastern redcedar, bur oak, white spruce, common hackberry | Green ash, golden willow, honeylocust | Eastern cottonwood |
| 1585: | | | | | |
| Spillville | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, eastern arborvitae, white fir | Austrian pine, Norway spruce | Pin oak, eastern white pine |
| Coland | Silky dogwood | American cranberrybush, Amur honeysuckle, Amur privet | Washington hawthorn, blue spruce, white fir, eastern arborvitae, Austrian pine | Norway spruce, eastern white pine | Pin oak |

Table 10.--Forestland Productivity

(Only the soils that are commonly used as forestland are listed. See text for an explanation of terms used in this table)

| Map symbol and component name | Potential productivity: Common trees | Site index | Volume of wood fiber | Trees to manage |
|---|---|---|---|---|
| | | | cu ft/ac | |
| 221: | | | | |
| Klossner | Black willow | --- | --- | --- |
| | Quaking aspen | 56 | 57 | |
| | Red maple | 51 | 29 | |
| | Silver maple | 76 | 29 | |
| | White ash | 51 | 29 | |
| 376F: | | | | |
| Cornell | Northern red oak | 55 | 43 | Eastern white pine, northern red oak, red pine, white oak |
| | White oak | 55 | 43 | |
| 672: | | | | |
| May City | Black oak | --- | --- | Norway spruce, eastern white pine, jack pine, red pine |
| | Jack pine | --- | --- | |
| | Northern pin oak | 52 | 29 | |
| 672B: | | | | |
| May City | Black oak | --- | --- | Norway spruce, eastern white pine, jack pine, red pine |
| | Jack pine | --- | --- | |
| | Northern pin oak | 52 | 29 | |
| 672C2: | | | | |
| May City | Black oak | --- | --- | Norway spruce, eastern white pine, jack pine, red pine |
| | Jack pine | --- | --- | |
| | Northern pin oak | 52 | 29 | |

Table 11a.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Camp areas | | Picnic areas | | Playgrounds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.15 | Restricted permeability | 0.15 | Restricted permeability | 0.15 |
| 27B: | | | | | | |
| Terril | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 27C: | | | | | | |
| Terril | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 27D: | | | | | | |
| Terril | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| 31: | | | | | | |
| Afton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 34B: | | | | | | |
| Estherville | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 41C: | | | | | | |
| Sparta | Somewhat limited | | Somewhat limited | | Very limited | |
| | Too sandy | 0.84 | Too sandy | 0.84 | Slope | 1.00 |
| | | | | | Too sandy | 0.84 |
| 48: | | | | | | |
| Knoke | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.15 | Restricted permeability | 0.15 | Restricted permeability | 0.15 |
| 54: | | | | | | |
| Zook | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | Restricted permeability | 0.94 | Restricted permeability | 0.94 |
| | Restricted permeability | 0.94 | | | Flooding | 0.60 |
| 55: | | | | | | |
| Nicollet | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas | | Picnic areas | | Playgrounds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 62F: | | | | | | |
| Storden | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 77B: | | | | | | |
| Sac | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 77C: | | | | | | |
| Sac | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 77C2: | | | | | | |
| Sac, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.15 | Restricted permeability | 0.15 | Restricted permeability | 0.15 |
| 95: | | | | | | |
| Harps | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 107: | | | | | | |
| Webster | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 108: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 108B: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | Flooding | 0.60 |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | Flooding | 0.60 |
| 138B: | | | | | | |
| Clarion | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas: Rating class and limiting features | Value | Picnic areas: Rating class and limiting features | Value | Playgrounds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 175: | | | | | | |
| Dickinson | Not limited | | Not limited | | Not limited | |
| 175B: | | | | | | |
| Dickinson | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 191: | | | | | | |
| Rushmore | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 201B: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | Flooding | 0.60 |
| Terril | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| 221: | | | | | | |
| Klossner | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 259: | | | | | | |
| Biscay | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 274: | | | | | | |
| Rolfe | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.94 | Restricted permeability | 0.94 | Restricted permeability | 0.94 |
| 282: | | | | | | |
| Ransom | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas: Rating class and limiting features | Value | Picnic areas: Rating class and limiting features | Value | Playgrounds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| 376F: | | | | | | |
| Cornell | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Not limited | | Not limited | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 384: | | | | | | |
| Collinwood | Very limited | | Very limited | | Very limited | |
| | Too clayey | 1.00 | Too clayey | 1.00 | Too clayey | 1.00 |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Restricted permeability | 0.60 | Restricted permeability | 0.60 | Restricted permeability | 0.60 |
| 390: | | | | | | |
| Waldorf | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.43 | Restricted permeability | 0.43 | Restricted permeability | 0.43 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas | | Picnic areas | | Playgrounds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 397: | | | | | | |
| Letri | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 433E: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 433F: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 433G: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 455: | | | | | | |
| Wilmonton | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 456: | | | | | | |
| Wilmonton | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 485: | | | | | | |
| Spillville | Very limited | | Somewhat limited | | Somewhat limited | |
| | Flooding | 1.00 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Depth to saturated zone | 0.98 | | | Flooding | 0.60 |
| 506: | | | | | | |
| Wacousta | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 507: | | | | | | |
| Canisteo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 541C: | | | | | | |
| Estherville | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| Hawick | Somewhat limited | | Somewhat limited | | Very limited | |
| | Too sandy | 0.60 | Too sandy | 0.60 | Slope | 1.00 |
| | | | | | Too sandy | 0.60 |
| | | | | | Gravel content | 0.04 |
| 559: | | | | | | |
| Talcot | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas: Rating class and limiting features | Value | Picnic areas: Rating class and limiting features | Value | Playgrounds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 577B: | | | | | | |
| Everly | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 577C2: | | | | | | |
| Everly, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 637D2: | | | | | | |
| Everly, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| Moneta, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| 638C2: | | | | | | |
| Clarion, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| Storden, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 672: | | | | | | |
| May City | Not limited | | Not limited | | Not limited | |
| 672B: | | | | | | |
| May City | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 672C2: | | | | | | |
| May City, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 709: | | | | | | |
| Fairhaven | Not limited | | Not limited | | Not limited | |
| 733: | | | | | | |
| Calco | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | Flooding | 0.60 |
| 735: | | | | | | |
| Havelock | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | Flooding | 0.60 |
| 740D: | | | | | | |
| Hawick | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| | Too sandy | 0.60 | Too sandy | 0.60 | Too sandy | 0.60 |
| | | | | | Gravel content | 0.04 |
| 810: | | | | | | |
| Galva, terrace | Not limited | | Not limited | | Not limited | |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas | | Picnic areas | | Playgrounds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 810B: | | | | | | |
| Galva, terrace | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 828B: | | | | | | |
| Zenor | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| | | | | | Gravel content | 0.04 |
| 828C2: | | | | | | |
| Zenor, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| | | | | | Gravel content | 0.04 |
| 835D2: | | | | | | |
| Storden, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| Omsrud, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| 835E2: | | | | | | |
| Storden, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| Omsrud, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 854D: | | | | | | |
| Histosols, fens | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum | Not limited | | Not limited | | Not limited | |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 875: | | | | | | |
| Roine | Not limited | | Not limited | | Not limited | |
| 875B: | | | | | | |
| Roine | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas: Rating class and limiting features | Value | Picnic areas: Rating class and limiting features | Value | Playgrounds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 875C2: | | | | | | |
| Roine, moderately eroded | Not limited | | Not limited | | Very limited | |
| | | | | | Slope | 1.00 |
| 878: | | | | | | |
| Ocheyedan | Not limited | | Not limited | | Not limited | |
| 878B: | | | | | | |
| Ocheyedan | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 879: | | | | | | |
| Fostoria | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| 928: | | | | | | |
| Annieville | Not limited | | Not limited | | Not limited | |
| 928B: | | | | | | |
| Annieville | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.50 |
| 992: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 1053: | | | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 1091: | | | | | | |
| McCreath | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| 1092: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.21 | Restricted permeability | 0.21 | Restricted permeability | 0.21 |
| 1133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | Flooding | 0.40 | Flooding | 1.00 |
| 1259: | | | | | | |
| Biscay, depressional | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |

Table 11a.--Recreation--Continued

| Map symbol and component name | Camp areas | | Picnic areas | | Playgrounds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1385: | | | | | | |
| Ocheda | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 0.75 | Depth to saturated zone | 0.98 |
| | Restricted permeability | 0.60 | Restricted permeability | 0.60 | Restricted permeability | 0.60 |
| 1508: | | | | | | |
| Belmann | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.43 | Restricted permeability | 0.43 | Restricted permeability | 0.43 |
| 1585: | | | | | | |
| Spillville | Very limited | | Somewhat limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 0.40 | Flooding | 1.00 |
| | Depth to saturated zone | 0.39 | Depth to saturated zone | 0.19 | Depth to saturated zone | 0.39 |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | Flooding | 0.40 | Flooding | 1.00 |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |
| SL: | | | | | | |
| Sewage lagoon | Not rated | | Not rated | | Not rated | |
| W: | | | | | | |
| Water | Not rated | | Not rated | | Not rated | |

Table 11b.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 27B: | | | | | | |
| Terril | Not limited | | Not limited | | Not limited | |
| 27C: | | | | | | |
| Terril | Not limited | | Not limited | | Not limited | |
| 27D: | | | | | | |
| Terril | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.63 |
| 31: | | | | | | |
| Afton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 34B: | | | | | | |
| Estherville | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.10 |
| 41C: | | | | | | |
| Sparta | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Too sandy | 0.84 | Too sandy | 0.84 | Droughty | 0.48 |
| 48: | | | | | | |
| Knoke | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 54: | | | | | | |
| Zook | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |
| 55: | | | | | | |
| Nicollet | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 62F: | | | | | | |
| Storden | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.82 | | | Slope | 1.00 |
| 77B: | | | | | | |
| Sac | Not limited | | Not limited | | Not limited | |
| 77C: | | | | | | |
| Sac | Not limited | | Not limited | | Not limited | |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 77C2: | | | | | | |
| Sac, moderately eroded | Not limited | | Not limited | | Not limited | |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 95: | | | | | | |
| Harps | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 107: | | | | | | |
| Webster | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 108: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 108B: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |
| 138B: | | | | | | |
| Clarion | Not limited | | Not limited | | Not limited | |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Not limited | | Not limited | | Not limited | |
| 175: | | | | | | |
| Dickinson | Not limited | | Not limited | | Not limited | |
| 175B: | | | | | | |
| Dickinson | Not limited | | Not limited | | Not limited | |
| 191: | | | | | | |
| Rushmore | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 201B: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 201B: | | | | | | |
| Terril | Not limited | | Not limited | | Not limited | |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 221: | | | | | | |
| Klossner | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 259: | | | | | | |
| Biscay | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 274: | | | | | | |
| Rolfe | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 282: | | | | | | |
| Ransom | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 376F: | | | | | | |
| Cornell | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.82 | | | Slope | 1.00 |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Not limited | | Not limited | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Not limited | | Not limited | |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Not limited | | Not limited | | Not limited | |
| 384: | | | | | | |
| Collinwood | Very limited | | Very limited | | Very limited | |
| | Too clayey | 1.00 | Too clayey | 1.00 | Too clayey | 1.00 |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 390: | | | | | | |
| Waldorf | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 397: | | | | | | |
| Letri | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 433E: | | | | | | |
| Moneta | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.02 | | | Slope | 1.00 |
| 433F: | | | | | | |
| Moneta | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.82 | | | Slope | 1.00 |
| 433G: | | | | | | |
| Moneta | Very limited | | Somewhat limited | | Very limited | |
| | Slope | 1.00 | Slope | 0.56 | Slope | 1.00 |
| 455: | | | | | | |
| Wilmonton | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 456: | | | | | | |
| Wilmonton | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 485: | | | | | | |
| Spillville | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| | | | | | Flooding | 0.60 |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails: Rating class and limiting features | Value | Off-road motorcycle trails: Rating class and limiting features | Value | Golf fairways: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 506: | | | | | | |
| Wacousta------------ | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 507: | | | | | | |
| Canisteo------------ | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 541C: | | | | | | |
| Estherville--------- | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.10 |
| Hawick-------------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Too sandy | 0.60 | Too sandy | 0.60 | Droughty | 0.91 |
| 559: | | | | | | |
| Talcot-------------- | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 577B: | | | | | | |
| Everly-------------- | Not limited | | Not limited | | Not limited | |
| 577C2: | | | | | | |
| Everly, moderately eroded------------ | Not limited | | Not limited | | Not limited | |
| 637D2: | | | | | | |
| Everly, moderately eroded------------ | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.63 |
| Moneta, moderately eroded------------ | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.63 |
| 638C2: | | | | | | |
| Clarion, moderately eroded------------ | Not limited | | Not limited | | Not limited | |
| Storden, moderately eroded------------ | Not limited | | Not limited | | Not limited | |
| 672: | | | | | | |
| May City------------ | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.22 |
| 672B: | | | | | | |
| May City------------ | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.22 |
| 672C2: | | | | | | |
| May City, moderately eroded------------ | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.41 |
| 709: | | | | | | |
| Fairhaven----------- | Not limited | | Not limited | | Not limited | |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 733: | | | | | | |
| Calco | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |
| 735: | | | | | | |
| Havelock | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | | | | | Flooding | 0.60 |
| 740D: | | | | | | |
| Hawick | Somewhat limited | | Somewhat limited | | Very limited | |
| | Too sandy | 0.60 | Too sandy | 0.60 | Droughty | 0.91 |
| | | | | | Slope | 0.63 |
| 810: | | | | | | |
| Galva, terrace | Not limited | | Not limited | | Not limited | |
| 810B: | | | | | | |
| Galva, terrace | Not limited | | Not limited | | Not limited | |
| 828B: | | | | | | |
| Zenor | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.11 |
| 828C2: | | | | | | |
| Zenor, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.25 |
| 835D2: | | | | | | |
| Storden, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.63 |
| Omsrud, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.63 |
| 835E2: | | | | | | |
| Storden, moderately eroded | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.02 | | | Slope | 1.00 |
| Omsrud, moderately eroded | Somewhat limited | | Not limited | | Very limited | |
| | Slope | 0.02 | | | Slope | 1.00 |
| 854D: | | | | | | |
| Histosols, fens | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum | Not limited | | Not limited | | Not limited | |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum | Not limited | | Not limited | | Not limited | |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails: Rating class and limiting features | Value | Off-road motorcycle trails: Rating class and limiting features | Value | Golf fairways: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Not limited | | Not limited | | Not limited | |
| 875: | | | | | | |
| Roine | Not limited | | Not limited | | Not limited | |
| 875B: | | | | | | |
| Roine | Not limited | | Not limited | | Not limited | |
| 875C2: | | | | | | |
| Roine, moderately eroded | Not limited | | Not limited | | Not limited | |
| 878: | | | | | | |
| Ocheyedan | Not limited | | Not limited | | Not limited | |
| 878B: | | | | | | |
| Ocheyedan | Not limited | | Not limited | | Not limited | |
| 879: | | | | | | |
| Fostoria | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 928: | | | | | | |
| Annieville | Not limited | | Not limited | | Not limited | |
| 928B: | | | | | | |
| Annieville | Not limited | | Not limited | | Not limited | |
| 992: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 1053: | | | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 1091: | | | | | | |
| McCreath | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 1092: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 1133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Flooding | 0.40 | Flooding | 0.40 | Depth to saturated zone | 1.00 |

Table 11b.--Recreation--Continued

| Map symbol and component name | Paths and trails | | Off-road motorcycle trails | | Golf fairways | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1259: | | | | | | |
| Biscay, depressional | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| 1385: | | | | | | |
| Ocheda | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.44 | Depth to saturated zone | 0.75 |
| 1508: | | | | | | |
| Belmann | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 1585: | | | | | | |
| Spillville | Somewhat limited | | Somewhat limited | | Very limited | |
| | Flooding | 0.40 | Flooding | 0.40 | Flooding | 1.00 |
| | | | | | Depth to saturated zone | 0.19 |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Flooding | 0.40 | Flooding | 0.40 | Depth to saturated zone | 1.00 |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |
| SL: | | | | | | |
| Sewage lagoon | Not rated | | Not rated | | Not rated | |
| W: | | | | | | |
| Water | Not rated | | Not rated | | Not rated | |

Table 12.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|
| 6: | | | | | | | | | | |
| Okoboji | Fair | Fair | Fair | Fair | Very poor | Good | Good | Fair | Fair | Good |
| 27B: | | | | | | | | | | |
| Terril | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 27C: | | | | | | | | | | |
| Terril | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 27D: | | | | | | | | | | |
| Terril | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 31: | | | | | | | | | | |
| Afton | Good | Good | Good | Fair | Poor | Good | Fair | Good | Fair | Fair |
| 34B: | | | | | | | | | | |
| Estherville | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 41C: | | | | | | | | | | |
| Sparta | Poor | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 48: | | | | | | | | | | |
| Knoke | Fair | Fair | Fair | Poor | Very poor | Good | Good | Fair | Poor | Good |
| 54: | | | | | | | | | | |
| Zook | Good | Fair | Good | Fair | Poor | Good | Good | Fair | Fair | Good |
| 55: | | | | | | | | | | |
| Nicollet | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 62F: | | | | | | | | | | |
| Storden | Poor | Fair | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 77B: | | | | | | | | | | |
| Sac | Good | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 77C: | | | | | | | | | | |
| Sac | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 77C2: | | | | | | | | | | |
| Sac, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 90: | | | | | | | | | | |
| Okoboji mucky silty clay loam | Fair | Fair | Fair | Fair | Very poor | Good | Good | Fair | Fair | Good |
| 95: | | | | | | | | | | |
| Harps | Fair | Fair | Fair | Fair | Poor | Good | Good | Fair | Fair | Good |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|
| 107: | | | | | | | | | | |
| Webster | Good | Good | Good | Fair | Poor | Good | Good | Good | Fair | Good |
| 108: | | | | | | | | | | |
| Wadena | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 108B: | | | | | | | | | | |
| Wadena | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 133: | | | | | | | | | | |
| Colo | Good | Fair | Good | Fair | Poor | Good | Good | Fair | Fair | Good |
| 135: | | | | | | | | | | |
| Coland | Good | Good | Good | Fair | Fair | Good | Good | Good | Fair | Good |
| 138B: | | | | | | | | | | |
| Clarion | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 138C2: | | | | | | | | | | |
| Clarion, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 175: | | | | | | | | | | |
| Dickinson | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 175B: | | | | | | | | | | |
| Dickinson | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 191: | | | | | | | | | | |
| Rushmore | Fair | Fair | Fair | Fair | Fair | Good | Good | Fair | Fair | Good |
| 201B: | | | | | | | | | | |
| Coland | Good | Good | Good | Fair | Fair | Good | Good | Good | Fair | Good |
| Terril | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 202: | | | | | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 203: | | | | | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 221: | | | | | | | | | | |
| Klossner | Poor | Poor | Poor | Poor | Poor | Good | Good | Poor | Poor | Good |
| 259: | | | | | | | | | | |
| Biscay | Good | Good | Good | Good | Fair | Good | Good | Good | Fair | Good |
| 274: | | | | | | | | | | |
| Rolfe | Fair | Fair | Fair | Fair | Poor | Good | Good | Fair | Fair | Good |
| 282: | | | | | | | | | | |
| Ransom | Good | Good | Fair | Good | Good | Poor | Poor | Good | Good | Poor |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|
| 308: Wadena, 32 to 40 inches to sand and gravel | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 308B: Wadena, 32 to 40 inches to sand and gravel | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 354: Aquolls (marsh), ponded | Very poor | Very poor | Fair | Very poor | Very poor | Good | Good | Fair | Poor | Good |
| 375: Fostoria, lacustrine substratum | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 376F: Cornell | Poor | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 379: Ocheyedan, lacustrine substratum | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 379B: Ocheyedan, lacustrine substratum | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 379C2: Ocheyedan, lacustrine substratum, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 384: Collinwood | Good | Good | Good | Good | Good | Poor | Poor | Fair | Good | Poor |
| 390: Waldorf | Good | Good | Fair | Fair | Fair | Good | Good | Good | Fair | Good |
| 397: Letri | Fair | Fair | Fair | Fair | Fair | Good | Good | Fair | Fair | Good |
| 433E: Moneta | Fair | Good | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 433F: Moneta | Poor | Fair | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 433G: Moneta | Poor | Fair | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 455: Wilmonton | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 456: Wilmonton | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|
| 485: | | | | | | | | | | |
| Spillville | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 506: | | | | | | | | | | |
| Wacousta | Good | Good | Fair | Good | Good | Good | Good | Good | Good | Good |
| 507: | | | | | | | | | | |
| Canisteo | Good | Good | Fair | Fair | Fair | Good | Good | Good | Fair | Good |
| 541C: | | | | | | | | | | |
| Estherville | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| Hawick | Poor | Poor | Fair | Poor | Poor | Very poor | Very poor | Poor | Poor | Very poor |
| 559: | | | | | | | | | | |
| Talcot | Good | Good | Fair | Fair | Fair | Good | Good | Good | Fair | Good |
| 577B: | | | | | | | | | | |
| Everly | Good | Good | Good | Good | Good | Poor | Very poor | Good | Good | Very poor |
| 577C2: | | | | | | | | | | |
| Everly, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 637D2: | | | | | | | | | | |
| Everly, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| Moneta, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 638C2: | | | | | | | | | | |
| Clarion, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| Storden, moderately eroded | Fair | Good | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 672: | | | | | | | | | | |
| May City | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 672B: | | | | | | | | | | |
| May City | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 672C2: | | | | | | | | | | |
| May City, moderately eroded | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 709: | | | | | | | | | | |
| Fairhaven | Good | Good | Good | Fair | Fair | Very poor | Very poor | Good | Fair | Very poor |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Openland wildlife | Woodland wildlife | Wetland wildlife |
|---|---|---|---|---|---|---|---|---|---|---|
| 733: | | | | | | | | | | |
| Calco | Good | Fair | Good | Poor | Very poor | Good | Good | Fair | Poor | Fair |
| 735: | | | | | | | | | | |
| Havelock | Good | Good | Good | Fair | Fair | Good | Good | Good | Fair | Good |
| 740D: | | | | | | | | | | |
| Hawick | Poor | Poor | Fair | Poor | Poor | Very poor | Very poor | Poor | Poor | Very poor |
| 810: | | | | | | | | | | |
| Galva, terrace | Good | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 810B: | | | | | | | | | | |
| Galva, terrace | Good | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 828B: | | | | | | | | | | |
| Zenor | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 828C2: | | | | | | | | | | |
| Zenor, moderately eroded | Fair | Fair | Fair | Fair | Fair | Very poor | Very poor | Fair | Fair | Very poor |
| 835D2: | | | | | | | | | | |
| Storden, moderately eroded | Fair | Good | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| Omsrud, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 835E2: | | | | | | | | | | |
| Storden, moderately eroded | Fair | Good | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| Omsrud, moderately eroded | Fair | Good | Good | Fair | Poor | Very poor | Very poor | Fair | Fair | Very poor |
| 854D: | | | | | | | | | | |
| Histosols, fens | Very poor | Poor | Fair | Poor | Very poor | Good | Good | Poor | Poor | Good |
| 874: | | | | | | | | | | |
| Dickinson, lacustrine substratum | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 874B: | | | | | | | | | | |
| Dickinson, lacustrine substratum | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 874C2: | | | | | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements: Grain and seed crops | Grasses and legumes | Wild herba- ceous plants | Hard- wood trees | Conif- erous plants | Wetland plants | Shallow water areas | Potential as habitat for--: Open- land wild- life | Wood- land wild- life | Wetland wild- life |
|---|---|---|---|---|---|---|---|---|---|---|
| 875: | | | | | | | | | | |
| Roine | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Very poor |
| 875B: | | | | | | | | | | |
| Roine | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Very poor |
| 875C2: | | | | | | | | | | |
| Roine, moderately eroded | Fair | Good | Good | Good | Good | Very poor | Poor | Fair | Fair | Very poor |
| 878: | | | | | | | | | | |
| Ocheyedan | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 878B: | | | | | | | | | | |
| Ocheyedan | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 879: | | | | | | | | | | |
| Fostoria | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 928: | | | | | | | | | | |
| Annieville | Good | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 928B: | | | | | | | | | | |
| Annieville | Good | Good | Good | Good | Good | Very poor | Very poor | Good | Good | Very poor |
| 992: | | | | | | | | | | |
| Gillett Grove | Fair | Fair | Fair | Fair | Very poor | Good | Good | Fair | Fair | Good |
| 1053: | | | | | | | | | | |
| Belmann, gypsum phase | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 1091: | | | | | | | | | | |
| McCreath | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| 1092: | | | | | | | | | | |
| Gillett Grove | Good | Good | Good | Fair | Poor | Good | Fair | Good | Fair | Fair |
| 1133: | | | | | | | | | | |
| Colo | Poor | Fair | Fair | Poor | Poor | Good | Good | Poor | Poor | Good |
| 1259: | | | | | | | | | | |
| Biscay, depressional | Fair | Fair | Fair | Fair | Poor | Good | Good | Fair | Fair | Good |
| 1385: | | | | | | | | | | |
| Ocheda | Fair | Fair | Fair | Good | Good | Poor | Fair | Fair | Good | Poor |
| 1508: | | | | | | | | | | |
| Belmann | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor |
| 1585: | | | | | | | | | | |
| Spillville | Good | Good | Good | Good | Good | Fair | Fair | Good | Good | Fair |
| Coland | Good | Good | Good | Fair | Fair | Good | Good | Good | Fair | Good |
| 5010: | | | | | | | | | | |
| Pits, sand and gravel | Poor | Poor | Fair | Good | Good | Poor | Very poor | Poor | Fair | Very poor |

Table 12.--Wildlife Habitat--Continued

| Map symbol and component name | Potential for habitat elements | | | | | | | Potential as habitat for-- | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| 5040. Udorthents, loamy | | | | | | | | | | |
| 5060. Pits, clay | | | | | | | | | | |
| AW. Animal waste | | | | | | | | | | |
| SL. Sewage lagoon | | | | | | | | | | |
| W. Water | | | | | | | | | | |

Table 13a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Dwellings without basements | | Dwellings with basements | | Small commercial buildings | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 27B: | | | | | | |
| Terril | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 27C: | | | | | | |
| Terril | Not limited | | Somewhat limited | | Somewhat limited | |
| | | | Depth to saturated zone | 0.16 | Slope | 0.88 |
| 27D: | | | | | | |
| Terril | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| | | | Depth to saturated zone | 0.16 | | |
| 31: | | | | | | |
| Afton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 34B: | | | | | | |
| Estherville | Not limited | | Not limited | | Not limited | |
| 41C: | | | | | | |
| Sparta | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| 48: | | | | | | |
| Knoke | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 54: | | | | | | |
| Zook | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 55: | | | | | | |
| Nicollet | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 62F: | | | | | | |
| Storden | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 77B: | | | | | | |
| Sac | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Depth to saturated zone | 0.16 | Shrink-swell | 0.50 |
| 77C: | | | | | | |
| Sac | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Depth to saturated zone | 0.16 | Slope | 0.88 |
| | | | | | Shrink-swell | 0.50 |
| 77C2: | | | | | | |
| Sac, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Depth to saturated zone | 0.16 | Slope | 0.88 |
| | | | | | Shrink-swell | 0.50 |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 95: | | | | | | |
| Harps | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 107: | | | | | | |
| Webster | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.32 | | | Shrink-swell | 0.32 |
| 108: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 108B: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 138B: | | | | | | |
| Clarion | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.01 | Depth to saturated zone | 0.16 | Shrink-swell | 0.01 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 138C2: | | | | | | |
| Clarion, moderately eroded | Not limited | | Somewhat limited | | Somewhat limited | |
| | | | Depth to saturated zone | 0.16 | Slope | 0.88 |
| 175: | | | | | | |
| Dickinson | Not limited | | Not limited | | Not limited | |
| 175B: | | | | | | |
| Dickinson | Not limited | | Not limited | | Not limited | |
| 191: | | | | | | |
| Rushmore | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 201B: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| Terril | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| 221: | | | | | | |
| Klossner | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Subsidence | 1.00 | Subsidence | 1.00 | Subsidence | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Content of organic matter | 1.00 | | | Content of organic matter | 1.00 |
| 259: | | | | | | |
| Biscay | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 274: | | | | | | |
| Rolfe | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 282: | | | | | | |
| Ransom | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| | Shrink-swell | 0.50 | | | Shrink-swell | 0.50 |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| 376F: | | | | | | |
| Cornell | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| | | | Depth to saturated zone | 0.16 | | |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Not limited | | Somewhat limited | | Somewhat limited | |
| | | | Depth to saturated zone | 0.16 | Slope | 0.88 |
| 384: | | | | | | |
| Collinwood | Very limited | | Very limited | | Very limited | |
| | Shrink-swell | 1.00 | Depth to saturated zone | 1.00 | Shrink-swell | 1.00 |
| | Depth to saturated zone | 0.98 | Shrink-swell | 1.00 | Depth to saturated zone | 0.98 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 390: | | | | | | |
| Waldorf | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 0.50 | Shrink-swell | 1.00 |
| 397: | | | | | | |
| Letri | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 433E: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 433F: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 433G: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 455: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 456: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 485: | | | | | | |
| Spillville | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| 506: | | | | | | |
| Wacousta | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 507: | | | | | | |
| Canisteo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.01 | | | Shrink-swell | 0.01 |
| 541C: | | | | | | |
| Estherville | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| Hawick | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 559: | | | | | | |
| Talcot | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | | | Shrink-swell | 0.50 |
| 577B: | | | | | | |
| Everly | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| | | | Depth to saturated zone | 0.16 | | |
| 577C2: | | | | | | |
| Everly, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Slope | 0.88 |
| | | | Depth to saturated zone | 0.16 | Shrink-swell | 0.50 |
| 637D2: | | | | | | |
| Everly, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| | | | Depth to saturated zone | 0.16 | | |
| Moneta, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 638C2: | | | | | | |
| Clarion, moderately eroded | Not limited | | Somewhat limited | | Somewhat limited | |
| | | | Depth to saturated zone | 0.16 | Slope | 0.88 |
| Storden, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| 672: | | | | | | |
| May City | Not limited | | Not limited | | Not limited | |
| 672B: | | | | | | |
| May City | Not limited | | Not limited | | Not limited | |
| 672C2: | | | | | | |
| May City, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| 709: | | | | | | |
| Fairhaven | Not limited | | Not limited | | Not limited | |
| 733: | | | | | | |
| Calco | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 735: | | | | | | |
| Havelock------------ | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | | | Shrink-swell | 1.00 |
| 740D: | | | | | | |
| Hawick-------------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| 810: | | | | | | |
| Galva, terrace------ | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 810B: | | | | | | |
| Galva, terrace------ | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 828B: | | | | | | |
| Zenor--------------- | Not limited | | Not limited | | Not limited | |
| 828C2: | | | | | | |
| Zenor, moderately eroded------------- | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| 835D2: | | | | | | |
| Storden, moderately eroded------------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| Omsrud, moderately eroded------------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 1.00 |
| 835E2: | | | | | | |
| Storden, moderately eroded------------- | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| Omsrud, moderately eroded------------- | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 854D: | | | | | | |
| Histosols, fens----- | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum--------- | Not limited | | Not limited | | Not limited | |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum--------- | Not limited | | Not limited | | Not limited | |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Slope | 0.88 |
| 875: | | | | | | |
| Roine | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 875B: | | | | | | |
| Roine | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 875C2: | | | | | | |
| Roine, moderately eroded | Not limited | | Somewhat limited | | Somewhat limited | |
| | | | Depth to saturated zone | 0.16 | Slope | 0.88 |
| 878: | | | | | | |
| Ocheyedan | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 878B: | | | | | | |
| Ocheyedan | Not limited | | Somewhat limited | | Not limited | |
| | | | Depth to saturated zone | 0.16 | | |
| 879: | | | | | | |
| Fostoria | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 0.98 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.98 |
| 928: | | | | | | |
| Annieville | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| | | | Depth to saturated zone | 0.16 | | |
| 928B: | | | | | | |
| Annieville | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| | | | Depth to saturated zone | 0.16 | | |
| 992: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 1053: | | | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements: Rating class and limiting features | Value | Dwellings with basements: Rating class and limiting features | Value | Small commercial buildings: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 1091: | | | | | | |
| McCreath | Very limited | | Very limited | | Very limited | |
| | Shrink-swell | 1.00 | Depth to saturated zone | 1.00 | Shrink-swell | 1.00 |
| | Depth to saturated zone | 0.98 | | | Depth to saturated zone | 0.98 |
| 1092: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 1133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 1259: | | | | | | |
| Biscay, depressional | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | | | Shrink-swell | 0.50 |
| 1385: | | | | | | |
| Ocheda | Very limited | | Very limited | | Very limited | |
| | Shrink-swell | 1.00 | Depth to saturated zone | 1.00 | Shrink-swell | 1.00 |
| | Depth to saturated zone | 0.98 | Shrink-swell | 1.00 | Depth to saturated zone | 0.98 |
| 1508: | | | | | | |
| Belmann | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 1.00 | Shrink-swell | 1.00 | Shrink-swell | 1.00 |
| 1585: | | | | | | |
| Spillville | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 0.39 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.39 |
| Coland | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Shrink-swell | 0.50 | Shrink-swell | 0.50 | Shrink-swell | 0.50 |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |

Table 13a.--Building Site Development--Continued

| Map symbol and component name | Dwellings without basements | | Dwellings with basements | | Small commercial buildings | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| SL: | | | | | | |
| Sewage lagoon------- | Not rated | | Not rated | | Not rated | |
| W: | | | | | | |
| Water--------------- | Not rated | | Not rated | | Not rated | |

Table 13b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Local roads and streets | | Shallow excavations | | Lawns and landscaping | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 27B: | | | | | | |
| Terril | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 0.50 | | | | |
| 27C: | | | | | | |
| Terril | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 0.50 | | | | |
| 27D: | | | | | | |
| Terril | Very limited | | Somewhat limited | | Somewhat limited | |
| | Low strength | 1.00 | Slope | 0.63 | Slope | 0.63 |
| | Slope | 0.63 | Depth to saturated zone | 0.16 | | |
| | Frost action | 0.50 | | | | |
| 31: | | | | | | |
| Afton | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 34B: | | | | | | |
| Estherville | Not limited | | Very limited | | Somewhat limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.10 |
| 41C: | | | | | | |
| Sparta | Not limited | | Very limited | | Somewhat limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.48 |
| 48: | | | | | | |
| Knoke | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 54: | | | | | | |
| Zook | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Frost action | 1.00 | Too clayey | 0.01 | | |
| | Flooding | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 55: | | | | | | |
| Nicollet | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Depth to saturated zone | 0.75 | | | | |
| 62F: | | | | | | |
| Storden | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Frost action | 0.50 | | | | |
| 77B: | | | | | | |
| Sac | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 77C: | | | | | | |
| Sac | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 77C2: | | | | | | |
| Sac, moderately eroded | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 95: | | | | | | |
| Harps | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| 107: | | | | | | |
| Webster | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| | Shrink-swell | 0.32 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 108: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 108B: | | | | | | |
| Wadena | Not limited | | Not limited | | Not limited | |
| 133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Frost action | 1.00 | | | | |
| | Flooding | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Flooding | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 138B: | | | | | | |
| Clarion | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| | Shrink-swell | 0.01 | | | | |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| 175: | | | | | | |
| Dickinson | Somewhat limited | | Very limited | | Not limited | |
| | Frost action | 0.50 | Cutbanks cave | 0.90 | | |
| 175B: | | | | | | |
| Dickinson | Somewhat limited | | Very limited | | Not limited | |
| | Frost action | 0.50 | Cutbanks cave | 0.90 | | |
| 191: | | | | | | |
| Rushmore | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 201B: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Flooding | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| Terril | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 0.50 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Depth to saturated zone | 0.75 | | | | |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Depth to saturated zone | 0.75 | Cutbanks cave | 0.90 | | |
| 221: | | | | | | |
| Klossner | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Subsidence | 1.00 | Content of organic matter | 1.00 | | |
| | Frost action | 1.00 | | | | |
| 259: | | | | | | |
| Biscay | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 0.78 | | | | |
| 274: | | | | | | |
| Rolfe | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Too clayey | 0.01 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 282: | | | | | | |
| Ransom | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Not limited | | Not limited | | Not limited | |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| 376F: | | | | | | |
| Cornell | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Somewhat limited | | Not limited | |
| | Frost action | 1.00 | Depth to saturated zone | 0.16 | | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Somewhat limited | | Not limited | |
| | Frost action | 1.00 | Depth to saturated zone | 0.16 | | |
| | | | Too clayey | 0.03 | | |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Very limited | | Somewhat limited | | Not limited | |
| | Frost action | 1.00 | Depth to saturated zone | 0.16 | | |
| 384: | | | | | | |
| Collinwood | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 1.00 |
| | Frost action | 1.00 | Too clayey | 0.28 | Depth to saturated zone | 0.75 |
| | Shrink-swell | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| 390: | | | | | | |
| Waldorf | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Too clayey | 0.28 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 397: | | | | | | |
| Letri | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets | | Shallow excavations | | Lawns and landscaping | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 433E: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 433F: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 433G: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 455: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 456: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 485: | | | | | | |
| Spillville | Very limited | | Very limited | | Somewhat limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Depth to saturated zone | 0.75 | | | | |
| | Frost action | 0.50 | | | | |
| 506: | | | | | | |
| Wacousta | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| 507: | | | | | | |
| Canisteo | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.01 | | | | |
| 541C: | | | | | | |
| Estherville | Not limited | | Very limited | | Somewhat limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.10 |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 541C: | | | | | | |
| Hawick | Not limited | | Very limited | | Very limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.91 |
| 559: | | | | | | |
| Talcot | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | Cutbanks cave | 0.90 | | |
| | Shrink-swell | 0.50 | | | | |
| 577B: | | | | | | |
| Everly | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 577C2: | | | | | | |
| Everly, moderately eroded | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 637D2: | | | | | | |
| Everly, moderately eroded | Very limited | | Somewhat limited | | Somewhat limited | |
| | Low strength | 1.00 | Slope | 0.63 | Slope | 0.63 |
| | Slope | 0.63 | Depth to saturated zone | 0.16 | | |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| Moneta, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |
| | Shrink-swell | 0.50 | | | | |
| | Frost action | 0.50 | | | | |
| 638C2: | | | | | | |
| Clarion, moderately eroded | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| Storden, moderately eroded | Somewhat limited | | Not limited | | Not limited | |
| | Frost action | 0.50 | | | | |
| 672: | | | | | | |
| May City | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.22 |
| 672B: | | | | | | |
| May City | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.22 |
| 672C2: | | | | | | |
| May City, moderately eroded | Not limited | | Not limited | | Somewhat limited | |
| | | | | | Droughty | 0.41 |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 709: | | | | | | |
| Fairhaven | Somewhat limited | | Not limited | | Not limited | |
| | Frost action | 0.50 | | | | |
| 733: | | | | | | |
| Calco | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Frost action | 1.00 | | | | |
| | Flooding | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 735: | | | | | | |
| Havelock | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 0.60 | Flooding | 0.60 |
| | Frost action | 1.00 | | | | |
| | Flooding | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 740D: | | | | | | |
| Hawick | Somewhat limited | | Very limited | | Very limited | |
| | Slope | 0.63 | Cutbanks cave | 0.90 | Droughty | 0.91 |
| | | | Slope | 0.63 | Slope | 0.63 |
| 810: | | | | | | |
| Galva, terrace | Very limited | | Not limited | | Not limited | |
| | Low strength | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 810B: | | | | | | |
| Galva, terrace | Very limited | | Not limited | | Not limited | |
| | Low strength | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 828B: | | | | | | |
| Zenor | Not limited | | Very limited | | Somewhat limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.11 |
| 828C2: | | | | | | |
| Zenor, moderately eroded | Not limited | | Very limited | | Somewhat limited | |
| | | | Cutbanks cave | 0.90 | Droughty | 0.25 |
| 835D2: | | | | | | |
| Storden, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |
| | Frost action | 0.50 | | | | |
| Omsrud, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |
| | Frost action | 0.50 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets: Rating class and limiting features | Value | Shallow excavations: Rating class and limiting features | Value | Lawns and landscaping: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 835E2: | | | | | | |
| Storden, moderately eroded------------- | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Frost action | 0.50 | | | | |
| Omsrud, moderately eroded------------- | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Frost action | 0.50 | | | | |
| 854D: | | | | | | |
| Histosols, fens----- | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum--------- | Very limited | | Very limited | | Not limited | |
| | Frost action | 1.00 | Cutbanks cave | 0.90 | | |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum--------- | Very limited | | Very limited | | Not limited | |
| | Frost action | 1.00 | Cutbanks cave | 0.90 | | |
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded-- | Very limited | | Very limited | | Not limited | |
| | Frost action | 1.00 | Cutbanks cave | 0.90 | | |
| 875: | | | | | | |
| Roine--------------- | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| 875B: | | | | | | |
| Roine--------------- | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| 875C2: | | | | | | |
| Roine, moderately eroded------------- | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| 878: | | | | | | |
| Ocheyedan----------- | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |
| 878B: | | | | | | |
| Ocheyedan----------- | Somewhat limited | | Somewhat limited | | Not limited | |
| | Frost action | 0.50 | Depth to saturated zone | 0.16 | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets | | Shallow excavations | | Lawns and landscaping | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 879: | | | | | | |
| Fostoria | Very limited | | Very limited | | Somewhat limited | |
| | Frost action | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Low strength | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| 928: | | | | | | |
| Annieville | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 928B: | | | | | | |
| Annieville | Very limited | | Somewhat limited | | Not limited | |
| | Low strength | 1.00 | Depth to saturated zone | 0.16 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 992: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 1053: | | | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 1091: | | | | | | |
| McCreath | Very limited | | Very limited | | Somewhat limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| 1092: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | | | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 1133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 0.80 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Flooding | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |

Table 13b.--Building Site Development--Continued

| Map symbol and component name | Local roads and streets | | Shallow excavations | | Lawns and landscaping | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1259: | | | | | | |
| Biscay, depressional | Very limited | | Very limited | | Very limited | |
| | Ponding | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Frost action | 1.00 | | | | |
| | Low strength | 0.78 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 1385: | | | | | | |
| Ocheda | Very limited | | Very limited | | Somewhat limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 0.75 |
| | Frost action | 1.00 | Too clayey | 0.28 | | |
| | Shrink-swell | 1.00 | | | | |
| | Depth to saturated zone | 0.75 | | | | |
| 1508: | | | | | | |
| Belmann | Very limited | | Very limited | | Very limited | |
| | Low strength | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Too clayey | 0.03 | | |
| | Frost action | 1.00 | | | | |
| | Shrink-swell | 1.00 | | | | |
| 1585: | | | | | | |
| Spillville | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Low strength | 1.00 | Flooding | 0.80 | Depth to saturated zone | 0.19 |
| | Frost action | 0.50 | | | | |
| | Depth to saturated zone | 0.19 | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Frost action | 1.00 | Flooding | 0.80 | Depth to saturated zone | 1.00 |
| | Flooding | 1.00 | | | | |
| | Low strength | 1.00 | | | | |
| | Shrink-swell | 0.50 | | | | |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |
| SL: | | | | | | |
| Sewage lagoon | Not rated | | Not rated | | Not rated | |
| W: | | | | | | |
| Water | Not rated | | Not rated | | Not rated | |

Table 14a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Septic tank absorption fields | | Sewage lagoons | |
|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | |
| Okoboji | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.91 | Seepage | 0.50 |
| 27B: | | | | |
| Terril | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.50 |
| | Restricted permeability | 0.25 | Slope | 0.32 |
| 27C: | | | | |
| Terril | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 27D: | | | | |
| Terril | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 1.00 |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.24 | | |
| 31: | | | | |
| Afton | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.28 |
| 34B: | | | | |
| Estherville | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| 41C: | | | | |
| Sparta | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| 48: | | | | |
| Knoke | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.91 | | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 54: | | | | |
| Zook | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.99 | | |
| 55: | | | | |
| Nicollet | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 62F: | | | | |
| Storden | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 77B: | | | | |
| Sac | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.24 | Slope | 0.32 |
| 77C: | | | | |
| Sac | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 77C2: | | | | |
| Sac, moderately eroded | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 90: | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.91 | Seepage | 0.50 |
| 95: | | | | |
| Harps | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 107: | | | | |
| Webster | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 108: | | | | |
| Wadena | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 108B: | | | | |
| Wadena | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 133: | | | | |
| Colo | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 135: | | | | |
| Coland | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 1.00 |
| 138B: | | | | |
| Clarion | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.50 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.25 | | |
| 138C2: | | | | |
| Clarion, moderately eroded | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | | | Seepage | 0.50 |
| | Restricted permeability | 0.25 | | |
| 175: | | | | |
| Dickinson | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| 175B: | | | | |
| Dickinson | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 191: | | | | |
| Rushmore | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 201B: | | | | |
| Coland | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 1.00 |
| Terril | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.50 |
| | Restricted permeability | 0.25 | Slope | 0.32 |
| 202: | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 203: | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.25 | | |
| 221: | | | | |
| Klossner | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Subsidence | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.37 | Content of organic matter | 1.00 |
| 259: | | | | |
| Biscay | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.25 | | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 274: | | | | |
| Rolfe | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.99 | Seepage | 0.50 |
| 282: | | | | |
| Ransom | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 308: | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.25 | | |
| 308B: | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.25 | | |
| 354: | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | |
| 375: | | | | |
| Fostoria, lacustrine substratum | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.96 | Seepage | 0.53 |
| 376F: | | | | |
| Cornell | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| | Depth to saturated zone | 0.43 | | |
| 379: | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Somewhat limited | |
| | Restricted permeability | 0.94 | Seepage | 0.53 |
| | Depth to saturated zone | 0.43 | | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 379B: | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Somewhat limited | |
| | Restricted permeability | 0.94 | Seepage | 0.53 |
| | Depth to saturated zone | 0.43 | Slope | 0.32 |
| 379C2: | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Very limited | | Very limited | |
| | Restricted permeability | 0.94 | Slope | 1.00 |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| 384: | | | | |
| Collinwood | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.96 | | |
| 390: | | | | |
| Waldorf | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.94 | | |
| 397: | | | | |
| Letri | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 433E: | | | | |
| Moneta | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 433F: | | | | |
| Moneta | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 433G: | | | | |
| Moneta | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 455: | | | | |
| Wilmonton | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 456: | | | | |
| Wilmonton | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 485: | | | | |
| Spillville | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 1.00 |
| 506: | | | | |
| Wacousta | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 507: | | | | |
| Canisteo | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 541C: | | | | |
| Estherville | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| Hawick | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| 559: | | | | |
| Talcot | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 577B: | | | | |
| Everly | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.24 | Slope | 0.32 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 577C2: | | | | |
| Everly, moderately eroded | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 637D2: | | | | |
| Everly, moderately eroded | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 1.00 |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.24 | | |
| Moneta, moderately eroded | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 638C2: | | | | |
| Clarion, moderately eroded | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| Storden, moderately eroded | Not limited | | Very limited | |
| | Restricted permeability | 0.25 | Slope | 1.00 |
| | | | Seepage | 0.50 |
| 672: | | | | |
| May City | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| 672B: | | | | |
| May City | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| 672C2: | | | | |
| May City, moderately eroded | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| 709: | | | | |
| Fairhaven | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 733: | | | | |
| Calco | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 735: | | | | |
| Havelock | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 1.00 |
| 740D: | | | | |
| Hawick | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Slope | 1.00 |
| | Slope | 0.63 | Seepage | 1.00 |
| 810: | | | | |
| Galva, terrace | Not limited | | Somewhat limited | |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 810B: | | | | |
| Galva, terrace | Not limited | | Somewhat limited | |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| | | | Slope | 0.32 |
| 828B: | | | | |
| Zenor | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| 828C2: | | | | |
| Zenor, moderately eroded | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| 835D2: | | | | |
| Storden, moderately eroded | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| Omsrud, moderately eroded | Somewhat limited | | Very limited | |
| | Slope | 0.63 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 835E2: | | | | |
| Storden, moderately eroded | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 835E2: | | | | |
| Omsrud, moderately eroded | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.50 |
| 854D: | | | | |
| Histosols, fens | Not rated | | Not rated | |
| 874: | | | | |
| Dickinson, lacustrine substratum | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 874B: | | | | |
| Dickinson, lacustrine substratum | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.24 | | |
| 874C2: | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Very limited | | Very limited | |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| | Restricted permeability | 0.24 | | |
| 875: | | | | |
| Roine | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Seepage | 1.00 |
| | Restricted permeability | 0.24 | | |
| 875B: | | | | |
| Roine | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Seepage | 1.00 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.24 | | |
| 875C2: | | | | |
| Roine, moderately eroded | Somewhat limited | | Very limited | |
| | Depth to saturated zone | 0.43 | Seepage | 1.00 |
| | | | Slope | 1.00 |
| | Restricted permeability | 0.24 | | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields: Rating class and limiting features | Value | Sewage lagoons: Rating class and limiting features | Value |
|---|---|---|---|---|
| 878: | | | | |
| Ocheyedan | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.24 | | |
| 878B: | | | | |
| Ocheyedan | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.24 | | |
| 879: | | | | |
| Fostoria | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 928: | | | | |
| Annieville | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | Restricted permeability | 0.25 | | |
| 928B: | | | | |
| Annieville | Somewhat limited | | Somewhat limited | |
| | Depth to saturated zone | 0.43 | Seepage | 0.53 |
| | | | Slope | 0.32 |
| | Restricted permeability | 0.25 | | |
| 992: | | | | |
| Gillett Grove | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 1053: | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.94 | | |
| 1091: | | | | |
| McCreath | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 0.53 |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields | | Sewage lagoons | |
|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1092: | | | | |
| Gillett Grove | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.92 | Seepage | 0.53 |
| 1133: | | | | |
| Colo | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.24 | Seepage | 0.53 |
| 1259: | | | | |
| Biscay, depressional | Very limited | | Very limited | |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Filtering capacity | 1.00 | Seepage | 1.00 |
| | Restricted permeability | 0.25 | | |
| 1385: | | | | |
| Ocheda | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.96 | | |
| 1508: | | | | |
| Belmann | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Restricted permeability | 0.94 | | |
| 1585: | | | | |
| Spillville | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 1.00 |
| Coland | Very limited | | Very limited | |
| | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Flooding | 1.00 |
| | Restricted permeability | 0.25 | Seepage | 1.00 |
| 5010: | | | | |
| Pits, sand and gravel | Not rated | | Not rated | |
| 5040: | | | | |
| Udorthents, loamy | Not rated | | Not rated | |

Table 14a.--Sanitary Facilities--Continued

| Map symbol and component name | Septic tank absorption fields | | Sewage lagoons | |
|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 5060: | | | | |
| Pits, clay---------- | Not rated | | Not rated | |
| AW: | | | | |
| Animal waste-------- | Not rated | | Not rated | |
| SL: | | | | |
| Sewage lagoon------- | Not rated | | Not rated | |
| W: | | | | |
| Water--------------- | Not rated | | Not rated | |

Table 14b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Trench sanitary landfill | | Area sanitary landfill | | Daily cover for landfill | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Hard to compact | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Too clayey | 0.50 | | | Depth to saturated zone | 1.00 |
| | | | | | Too clayey | 0.50 |
| 27B: | | | | | | |
| Terril | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 27C: | | | | | | |
| Terril | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 27D: | | | | | | |
| Terril | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Slope | 0.63 |
| | Slope | 0.63 | Slope | 0.63 | | |
| 31: | | | | | | |
| Afton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Hard to compact | 1.00 |
| | Too clayey | 0.50 | | | Depth to saturated zone | 1.00 |
| | | | | | Too clayey | 0.50 |
| 34B: | | | | | | |
| Estherville | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 41C: | | | | | | |
| Sparta | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 48: | | | | | | |
| Knoke | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Hard to compact | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Too clayey | 1.00 | | | Depth to saturated zone | 1.00 |
| | | | | | Too clayey | 0.50 |
| 54: | | | | | | |
| Zook | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Hard to compact | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 1.00 | | | Too clayey | 1.00 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill | | Area sanitary landfill | | Daily cover for landfill | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 55: | | | | | | |
| Nicollet | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 62F: | | | | | | |
| Storden | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 77B: | | | | | | |
| Sac | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 77C: | | | | | | |
| Sac | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 77C2: | | | | | | |
| Sac, moderately eroded | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Hard to compact | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Too clayey | 0.50 | | | Depth to saturated zone | 1.00 |
| | | | | | Too clayey | 0.50 |
| 95: | | | | | | |
| Harps | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 107: | | | | | | |
| Webster | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 108: | | | | | | |
| Wadena | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 108B: | | | | | | |
| Wadena | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 133: | | | | | | |
| Colo | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill | | Area sanitary landfill | | Daily cover for landfill | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Seepage | 1.00 | | | | |
| | Too clayey | 0.50 | | | | |
| 138B: | | | | | | |
| Clarion | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 175: | | | | | | |
| Dickinson | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 175B: | | | | | | |
| Dickinson | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 191: | | | | | | |
| Rushmore | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 201B: | | | | | | |
| Coland | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Seepage | 1.00 | | | | |
| | Too clayey | 0.50 | | | | |
| Terril | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Depth to saturated zone | 1.00 | Too sandy | 1.00 |
| | Depth to saturated zone | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
| | Seepage | 1.00 | | | Depth to saturated zone | 1.00 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill: Rating class and limiting features | Value | Area sanitary landfill: Rating class and limiting features | Value | Daily cover for landfill: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Depth to saturated zone | 1.00 | Seepage | 1.00 |
| | Depth to saturated zone | 1.00 | Seepage | 1.00 | Depth to saturated zone | 1.00 |
| | Seepage | 1.00 | | | Too sandy | 0.50 |
| 221: | | | | | | |
| Klossner | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | Seepage | 1.00 | Too clayey | 0.50 |
| 259: | | | | | | |
| Biscay | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
| | Seepage | 1.00 | | | Too sandy | 0.50 |
| 274: | | | | | | |
| Rolfe | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Hard to compact | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Ponding | 1.00 |
| | Too clayey | 1.00 | | | Depth to saturated zone | 1.00 |
| | | | | | Too clayey | 1.00 |
| 282: | | | | | | |
| Ransom | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill: Rating class and limiting features | Value | Area sanitary landfill: Rating class and limiting features | Value | Daily cover for landfill: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 376F: | | | | | | |
| Cornell | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Slope | 1.00 | Slope | 1.00 |
| | Slope | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 384: | | | | | | |
| Collinwood | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 1.00 |
| | Too clayey | 1.00 | | | Depth to saturated zone | 1.00 |
| 390: | | | | | | |
| Waldorf | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 1.00 | | | Too clayey | 0.50 |
| 397: | | | | | | |
| Letri | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 433E: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 433F: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 433G: | | | | | | |
| Moneta | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 455: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill | | Area sanitary landfill | | Daily cover for landfill | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 456: | | | | | | |
| Wilmonton | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 485: | | | | | | |
| Spillville | Very limited | | Very limited | | Very limited | |
| | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| | Seepage | 1.00 | | | | |
| 506: | | | | | | |
| Wacousta | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 507: | | | | | | |
| Canisteo | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 541C: | | | | | | |
| Estherville | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| Hawick | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 559: | | | | | | |
| Talcot | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Depth to saturated zone | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | Seepage | 1.00 | | | Seepage | 1.00 |
| 577B: | | | | | | |
| Everly | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 577C2: | | | | | | |
| Everly, moderately eroded | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 637D2: | | | | | | |
| Everly, moderately eroded | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Slope | 0.63 |
| | Slope | 0.63 | Slope | 0.63 | | |
| Moneta, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill |  | Area sanitary landfill |  | Daily cover for landfill |  |
|---|---|---|---|---|---|---|
|  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 638C2: |  |  |  |  |  |  |
| Clarion, moderately eroded | Very limited |  | Very limited |  | Not limited |  |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |  |  |
| Storden, moderately eroded | Not limited |  | Not limited |  | Not limited |  |
| 672: |  |  |  |  |  |  |
| May City | Very limited |  | Very limited |  | Very limited |  |
|  | Seepage | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  |  |  |  |  | Gravel content | 0.01 |
| 672B: |  |  |  |  |  |  |
| May City | Very limited |  | Very limited |  | Very limited |  |
|  | Seepage | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  |  |  |  |  | Gravel content | 0.01 |
| 672C2: |  |  |  |  |  |  |
| May City, moderately eroded | Very limited |  | Very limited |  | Very limited |  |
|  | Seepage | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  |  |  |  |  | Gravel content | 0.01 |
| 709: |  |  |  |  |  |  |
| Fairhaven | Very limited |  | Very limited |  | Very limited |  |
|  | Too sandy | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  | Seepage | 1.00 |  |  | Too sandy | 0.50 |
| 733: |  |  |  |  |  |  |
| Calco | Very limited |  | Very limited |  | Very limited |  |
|  | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
|  | Too clayey | 0.50 |  |  |  |  |
| 735: |  |  |  |  |  |  |
| Havelock | Very limited |  | Very limited |  | Very limited |  |
|  | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Seepage | 0.52 |
|  | Seepage | 1.00 |  |  | Too clayey | 0.50 |
| 740D: |  |  |  |  |  |  |
| Hawick | Very limited |  | Very limited |  | Very limited |  |
|  | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
|  | Seepage | 1.00 | Slope | 0.63 | Seepage | 1.00 |
|  | Slope | 0.63 |  |  | Slope | 0.63 |
| 810: |  |  |  |  |  |  |
| Galva, terrace | Not limited |  | Not limited |  | Somewhat limited |  |
|  |  |  |  |  | Too clayey | 0.50 |
| 810B: |  |  |  |  |  |  |
| Galva, terrace | Not limited |  | Not limited |  | Somewhat limited |  |
|  |  |  |  |  | Too clayey | 0.50 |
| 828B: |  |  |  |  |  |  |
| Zenor | Very limited |  | Very limited |  | Very limited |  |
|  | Too sandy | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  | Seepage | 1.00 |  |  | Too sandy | 0.50 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill: Rating class and limiting features | Value | Area sanitary landfill: Rating class and limiting features | Value | Daily cover for landfill: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 828C2: | | | | | | |
| Zenor, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
| | Seepage | 1.00 | | | Too sandy | 0.50 |
| 835D2: | | | | | | |
| Storden, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |
| Omsrud, moderately eroded | Somewhat limited | | Somewhat limited | | Somewhat limited | |
| | Slope | 0.63 | Slope | 0.63 | Slope | 0.63 |
| 835E2: | | | | | | |
| Storden, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| Omsrud, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Slope | 1.00 | Slope | 1.00 | Slope | 1.00 |
| 854D: | | | | | | |
| Histosols, fens | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | | | | | Seepage | 1.00 |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | | | | | Seepage | 1.00 |
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Very limited | | Very limited | | Very limited | |
| | Too sandy | 1.00 | Seepage | 1.00 | Too sandy | 1.00 |
| | | | | | Seepage | 1.00 |
| 875: | | | | | | |
| Roine | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Seepage | 0.52 |
| | | | Seepage | 1.00 | | |
| 875B: | | | | | | |
| Roine | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Seepage | 0.52 |
| | | | Seepage | 1.00 | | |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill: Rating class and limiting features | Value | Area sanitary landfill: Rating class and limiting features | Value | Daily cover for landfill: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 875C2: | | | | | | |
| Roine, moderately eroded | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Seepage | 0.52 |
| | | | Seepage | 1.00 | | |
| 878: | | | | | | |
| Ocheyedan | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 878B: | | | | | | |
| Ocheyedan | Very limited | | Very limited | | Not limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | | |
| 879: | | | | | | |
| Fostoria | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| 928: | | | | | | |
| Annieville | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 928B: | | | | | | |
| Annieville | Very limited | | Very limited | | Somewhat limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
| | Too clayey | 0.50 | | | | |
| 992: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
| | Ponding | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 1053: | | | | | | |
| Belmann, gypsum phase | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 1091: | | | | | | |
| McCreath | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |
| 1092: | | | | | | |
| Gillett Grove | Very limited | | Very limited | | Very limited | |
| | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
| | Too clayey | 0.50 | | | Too clayey | 0.50 |

Table 14b.--Sanitary Facilities--Continued

| Map symbol and component name | Trench sanitary landfill |  | Area sanitary landfill |  | Daily cover for landfill |  |
|---|---|---|---|---|---|---|
|  | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1133: |  |  |  |  |  |  |
| Colo | Very limited |  | Very limited |  | Very limited |  |
|  | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
|  | Too clayey | 0.50 |  |  |  |  |
| 1259: |  |  |  |  |  |  |
| Biscay, depressional | Very limited |  | Very limited |  | Very limited |  |
|  | Too sandy | 1.00 | Ponding | 1.00 | Ponding | 1.00 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
|  | Ponding | 1.00 | Seepage | 1.00 | Seepage | 1.00 |
|  | Seepage | 1.00 |  |  | Too sandy | 0.50 |
| 1385: |  |  |  |  |  |  |
| Ocheda | Very limited |  | Very limited |  | Very limited |  |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
|  | Too clayey | 0.50 |  |  | Too clayey | 0.50 |
| 1508: |  |  |  |  |  |  |
| Belmann | Very limited |  | Very limited |  | Very limited |  |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |
|  | Too clayey | 1.00 |  |  | Too clayey | 1.00 |
| 1585: |  |  |  |  |  |  |
| Spillville | Very limited |  | Very limited |  | Somewhat limited |  |
|  | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 0.86 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 |  |  |
|  | Seepage | 1.00 |  |  |  |  |
| Coland | Very limited |  | Very limited |  | Very limited |  |
|  | Flooding | 1.00 | Flooding | 1.00 | Depth to saturated zone | 1.00 |
|  | Depth to saturated zone | 1.00 | Depth to saturated zone | 1.00 | Too clayey | 0.50 |
|  | Seepage | 1.00 | Seepage | 1.00 |  |  |
|  | Too clayey | 0.50 |  |  |  |  |
| 5010: |  |  |  |  |  |  |
| Pits, sand and gravel | Not rated |  | Not rated |  | Not rated |  |
| 5040: |  |  |  |  |  |  |
| Udorthents, loamy | Not rated |  | Not rated |  | Not rated |  |
| 5060: |  |  |  |  |  |  |
| Pits, clay | Not rated |  | Not rated |  | Not rated |  |
| AW: |  |  |  |  |  |  |
| Animal waste | Not rated |  | Not rated |  | Not rated |  |
| SL: |  |  |  |  |  |  |
| Sewage lagoon | Not rated |  | Not rated |  | Not rated |  |
| W: |  |  |  |  |  |  |
| Water | Not rated |  | Not rated |  | Not rated |  |

Table 15.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the potential limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Potential as source of gravel | | Potential as source of sand | | Potential as source of topsoil | |
|---|---|---|---|---|---|---|
| | Rating class | Value | Rating class | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 27B: | | | | | | |
| Terril | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 27C: | | | | | | |
| Terril | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 27D: | | | | | | |
| Terril | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.37 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 31: | | | | | | |
| Afton | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 34B: | | | | | | |
| Estherville | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.03 | Too sandy | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.69 | Rock fragments | 0.00 |
| | | | | | Hard to reclaim | 0.82 |
| 41C: | | | | | | |
| Sparta | Improbable | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.10 | Too sandy | 0.00 |
| | Bottom layer | 0.00 | Bottom layer | 0.34 | | |
| 48: | | | | | | |
| Knoke | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| | | | | | Too clayey | 0.00 |
| | | | | | Carbonate content | 0.97 |
| 54: | | | | | | |
| Zook | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 55: | | | | | | |
| Nicollet | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.89 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 62F: | | | | | | |
| Storden | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.97 |
| 77B: | | | | | | |
| Sac | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 77C: | | | | | | |
| Sac | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 77C2: | | | | | | |
| Sac, moderately eroded | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 95: | | | | | | |
| Harps | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.68 |
| 107: | | | | | | |
| Webster | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 108: | | | | | | |
| Wadena | Possible | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Hard to reclaim | 0.82 |
| | Bottom layer | 0.04 | Thickest layer | 0.00 | | |
| 108B: | | | | | | |
| Wadena | Possible | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Hard to reclaim | 0.82 |
| | Bottom layer | 0.04 | Thickest layer | 0.00 | | |
| 133: | | | | | | |
| Colo | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 135: | | | | | | |
| Coland | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 138B: | | | | | | |
| Clarion | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 175: | | | | | | |
| Dickinson | Improbable | | Fair | | Good | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | | |
| | Bottom layer | 0.00 | Bottom layer | 0.36 | | |
| 175B: | | | | | | |
| Dickinson | Improbable | | Fair | | Good | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | | |
| | Bottom layer | 0.00 | Bottom layer | 0.36 | | |
| 191: | | | | | | |
| Rushmore | Not rated | | Not rated | | Poor | |
| | | | | | Depth to saturated zone | 0.00 |
| 201B: | | | | | | |
| Coland | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| | | | | | Too clayey | 0.00 |
| Terril | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Too sandy | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.36 | Rock fragments | 0.02 |
| | | | | | Depth to saturated zone | 0.89 |
| | | | | | Hard to reclaim | 0.97 |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Too sandy | 0.01 |
| | Bottom layer | 0.04 | Bottom layer | 0.10 | Rock fragments | 0.04 |
| | | | | | Depth to saturated zone | 0.89 |
| | | | | | Hard to reclaim | 0.99 |
| 221: | | | | | | |
| Klossner | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| | | | | | Content of organic matter | 0.00 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 259: | | | | | | |
| Biscay | Possible | | Poor | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.09 | Hard to reclaim | 0.68 |
| 274: | | | | | | |
| Rolfe | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 282: | | | | | | |
| Ransom | Not rated | | Not rated | | Poor | |
| | | | | | Too clayey | 0.00 |
| | | | | | Depth to saturated zone | 0.89 |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Possible | | Poor | | Fair | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Hard to reclaim | 0.82 |
| | Bottom layer | 0.04 | Bottom layer | 0.09 | | |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Possible | | Poor | | Fair | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Hard to reclaim | 0.82 |
| | Bottom layer | 0.04 | Bottom layer | 0.09 | | |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not rated | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.89 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 376F: | | | | | | |
| Cornell | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 384: | | | | | | |
| Collinwood | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.89 |
| 390: | | | | | | |
| Waldorf | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 397: | | | | | | |
| Letri | Not rated | | Not rated | | Poor | |
| | | | | | Depth to saturated zone | 0.00 |
| 433E: | | | | | | |
| Moneta | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.80 |
| 433F: | | | | | | |
| Moneta | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.80 |
| 433G: | | | | | | |
| Moneta | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.80 |
| 455: | | | | | | |
| Wilmonton | Not rated | | Not rated | | Fair | |
| | | | | | Depth to saturated zone | 0.89 |
| | | | | | Carbonate content | 0.99 |
| 456: | | | | | | |
| Wilmonton | Not rated | | Not rated | | Fair | |
| | | | | | Depth to saturated zone | 0.89 |
| 485: | | | | | | |
| Spillville | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.89 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 506: | | | | | | |
| Wacousta | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| | | | | | Carbonate content | 0.97 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 507: | | | | | | |
| Canisteo | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 541C: | | | | | | |
| Estherville | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.03 | Too sandy | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.45 | Rock fragments | 0.00 |
| | | | | | Hard to reclaim | 0.82 |
| Hawick | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.10 | Too sandy | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.50 | Rock fragments | 0.03 |
| | | | | | Hard to reclaim | 0.98 |
| 559: | | | | | | |
| Talcot | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.75 | Too clayey | 0.00 |
| | | | | | Hard to reclaim | 0.82 |
| | | | | | Carbonate content | 0.97 |
| 577B: | | | | | | |
| Everly | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 577C2: | | | | | | |
| Everly, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 637D2: | | | | | | |
| Everly, moderately eroded | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.37 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| Moneta, moderately eroded | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.37 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.80 |
| 638C2: | | | | | | |
| Clarion, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| Storden, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Carbonate content | 0.97 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 672: | | | | | | |
| May City | Possible | | Poor | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Rock fragments | 0.00 |
| | Bottom layer | 0.12 | Bottom layer | 0.02 | Hard to reclaim | 0.68 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 672B: | | | | | | |
| May City------------ | Possible | | Poor | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Rock fragments | 0.00 |
| | Bottom layer | 0.12 | Bottom layer | 0.02 | Hard to reclaim | 0.68 |
| 672C2: | | | | | | |
| May City, moderately eroded------------- | Possible | | Poor | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Rock fragments | 0.00 |
| | Bottom layer | 0.12 | Bottom layer | 0.02 | Hard to reclaim | 0.68 |
| 709: | | | | | | |
| Fairhaven----------- | Possible | | Poor | | Fair | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Hard to reclaim | 0.68 |
| | Bottom layer | 0.01 | Bottom layer | 0.08 | | |
| 733: | | | | | | |
| Calco--------------- | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| | | | | | Too clayey | 0.00 |
| | | | | | Carbonate content | 0.97 |
| 735: | | | | | | |
| Havelock------------ | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Bottom layer | 0.03 | | |
| | | | | | Too clayey | 0.00 |
| | | | | | Carbonate content | 0.97 |
| 740D: | | | | | | |
| Hawick-------------- | Possible | | Fair | | Poor | |
| | Thickest layer | 0.00 | Thickest layer | 0.10 | Too sandy | 0.00 |
| | Bottom layer | 0.04 | Bottom layer | 0.50 | Rock fragments | 0.03 |
| | | | | | Slope | 0.37 |
| | | | | | Hard to reclaim | 0.98 |
| 810: | | | | | | |
| Galva, terrace------ | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 810B: | | | | | | |
| Galva, terrace------ | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 828B: | | | | | | |
| Zenor--------------- | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Thickest layer | 0.03 | Rock fragments | 0.97 |
| | Bottom layer | 0.00 | Bottom layer | 0.09 | | |
| 828C2: | | | | | | |
| Zenor, moderately eroded------------ | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Thickest layer | 0.03 | Rock fragments | 0.97 |
| | Bottom layer | 0.00 | Bottom layer | 0.09 | | |
| 835D2: | | | | | | |
| Storden, moderately eroded------------ | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.37 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.97 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 835D2: | | | | | | |
| Omsrud, moderately eroded | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.37 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 835E2: | | | | | | |
| Storden, moderately eroded | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Carbonate content | 0.97 |
| Omsrud, moderately eroded | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Slope | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 854D: | | | | | | |
| Histosols, fens | Not rated | | Not rated | | Not rated | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum | Improbable | | Fair | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.36 | | |
| 874B: | | | | | | |
| Dickinson, lacustrine substratum | Improbable | | Fair | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.36 | | |
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | Improbable | | Fair | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.36 | | |
| 875: | | | | | | |
| Roine | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.01 | | |
| 875B: | | | | | | |
| Roine | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.01 | | |
| 875C2: | | | | | | |
| Roine, moderately eroded | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.01 | | |
| 878: | | | | | | |
| Ocheyedan | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 878B: | | | | | | |
| Ocheyedan | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 879: | | | | | | |
| Fostoria | Improbable | | Poor | | Fair | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.89 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 928: | | | | | | |
| Annieville | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 928B: | | | | | | |
| Annieville | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| 992: | | | | | | |
| Gillett Grove | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 1053: | | | | | | |
| Belmann, gypsum phase | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 1091: | | | | | | |
| McCreath | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.89 |
| 1092: | | | | | | |
| Gillett Grove | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 1133: | | | | | | |
| Colo | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 1259: | | | | | | |
| Biscay, depressional | Not rated | | Not rated | | Poor | |
| | | | | | Depth to saturated zone | 0.00 |
| | | | | | Hard to reclaim | 0.68 |
| 1385: | | | | | | |
| Ocheda | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.89 |

Table 15.--Construction Materials--Continued

| Map symbol and component name | Potential as source of gravel: Rating class | Value | Potential as source of sand: Rating class | Value | Potential as source of topsoil: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 1508: | | | | | | |
| Belmann | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Too clayey | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Depth to saturated zone | 0.00 |
| 1585: | | | | | | |
| Spillville | Improbable | | Poor | | Good | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | | |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | | |
| Coland | Improbable | | Poor | | Poor | |
| | Thickest layer | 0.00 | Bottom layer | 0.00 | Depth to saturated zone | 0.00 |
| | Bottom layer | 0.00 | Thickest layer | 0.00 | Too clayey | 0.00 |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |
| SL: | | | | | | |
| Sewage lagoon | Not rated | | Not rated | | Not rated | |
| W: | | | | | | |
| Water | Not rated | | Not rated | | Not rated | |

Table 16.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. "Not rated" indicates that data are not available or that no rating is applicable. See text for further explanation of ratings in this table)

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 6: | | | | | | |
| Okoboji | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Ponding | 1.00 | Slow refill | 0.30 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.84 | | |
| 27B: | | | | | | |
| Terril | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.70 | Piping | 0.46 | Depth to water | 1.00 |
| 27C: | | | | | | |
| Terril | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.46 | Depth to water | 1.00 |
| 27D: | | | | | | |
| Terril | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.46 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| 31: | | | | | | |
| Afton | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| 34B: | | | | | | |
| Estherville | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.69 | Depth to water | 1.00 |
| 41C: | | | | | | |
| Sparta | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.34 | Depth to water | 1.00 |
| 48: | | | | | | |
| Knoke | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.05 | Ponding | 1.00 | Slow refill | 0.95 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.59 | | |
| 54: | | | | | | |
| Zook | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.05 | Depth to saturated zone | 1.00 | Slow refill | 0.95 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Hard to pack | 1.00 | | |
| 55: | | | | | | |
| Nicollet | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Depth to saturated zone | 1.00 | Slow refill | 0.30 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.97 | | |
| 62F: | | | | | | |
| Storden | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| | Slope | 0.18 | | | | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 77B: | | | | | | |
| Sac | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.41 | Depth to water | 1.00 |
| 77C: | | | | | | |
| Sac | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.41 | Depth to water | 1.00 |
| 77C2: | | | | | | |
| Sac, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.44 | Depth to water | 1.00 |
| 90: | | | | | | |
| Okoboji mucky silty clay loam | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Ponding | 1.00 | Slow refill | 0.30 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.47 | | |
| 95: | | | | | | |
| Harps | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Depth to saturated zone | 1.00 | Slow refill | 0.30 |
| | | | | | Cutbanks cave | 0.10 |
| 107: | | | | | | |
| Webster | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Depth to saturated zone | 1.00 | Slow refill | 0.30 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.22 | | |
| 108: | | | | | | |
| Wadena | Very limited | | Not limited | | Very limited | |
| | Seepage | 1.00 | | | Depth to water | 1.00 |
| 108B: | | | | | | |
| Wadena | Very limited | | Not limited | | Very limited | |
| | Seepage | 1.00 | | | Depth to water | 1.00 |
| 133: | | | | | | |
| Colo | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| 135: | | | | | | |
| Coland | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.22 | | |
| 138B: | | | | | | |
| Clarion | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| 138C2: | | | | | | |
| Clarion, moderately eroded | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 175: | | | | | | |
| Dickinson----------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.36 | Depth to water | 1.00 |
| 175B: | | | | | | |
| Dickinson----------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.36 | Depth to water | 1.00 |
| 191: | | | | | | |
| Rushmore------------ | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.10 | | |
| 201B: | | | | | | |
| Coland-------------- | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.22 | | |
| Terril-------------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.70 | Piping | 0.46 | Depth to water | 1.00 |
| 202: | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel------------- | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 1.00 |
| | | | Seepage | 0.36 | | |
| 203: | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel------------- | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 1.00 |
| | | | Seepage | 0.10 | | |
| 221: | | | | | | |
| Klossner------------ | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Ponding | 1.00 | Cutbanks cave | 0.10 |
| | | | Depth to saturated zone | 1.00 | | |
| 259: | | | | | | |
| Biscay-------------- | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 1.00 |
| | | | Seepage | 0.09 | | |
| 274: | | | | | | |
| Rolfe--------------- | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Ponding | 1.00 | Slow refill | 0.30 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| 282: | | | | | | |
| Ransom-------------- | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.91 | | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 308: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.09 | Depth to water | 1.00 |
| 308B: | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.09 | Depth to water | 1.00 |
| 354: | | | | | | |
| Aquolls (marsh), ponded | Not limited | | Not rated | | Not rated | |
| 375: | | | | | | |
| Fostoria, lacustrine substratum | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.10 | | |
| 376F: | | | | | | |
| Cornell | Somewhat limited | | Not limited | | Very limited | |
| | Seepage | 0.72 | | | Depth to water | 1.00 |
| | Slope | 0.18 | | | | |
| 379: | | | | | | |
| Ocheyedan, lacustrine substratum | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.74 | Depth to water | 1.00 |
| 379B: | | | | | | |
| Ocheyedan, lacustrine substratum | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.74 | Depth to water | 1.00 |
| 379C2: | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.77 | Depth to water | 1.00 |
| 384: | | | | | | |
| Collinwood | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.02 | Depth to saturated zone | 1.00 | Slow refill | 0.98 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.06 | | |
| 390: | | | | | | |
| Waldorf | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.02 | Depth to saturated zone | 1.00 | Slow refill | 0.98 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.03 | | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 397: | | | | | | |
| Letri | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Cutbanks cave | 1.00 |
| | | | | | Slow refill | 0.28 |
| | | | Piping | 0.07 | | |
| 433E: | | | | | | |
| Moneta | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.71 | Depth to water | 1.00 |
| | Slope | 0.04 | | | | |
| 433F: | | | | | | |
| Moneta | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.71 | Depth to water | 1.00 |
| | Slope | 0.18 | | | | |
| 433G: | | | | | | |
| Moneta | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.71 | Depth to water | 1.00 |
| | Slope | 0.64 | | | | |
| 455: | | | | | | |
| Wilmonton | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.04 | Depth to saturated zone | 1.00 | Slow refill | 0.96 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.08 | | |
| 456: | | | | | | |
| Wilmonton | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.04 | Depth to saturated zone | 1.00 | Slow refill | 0.96 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.06 | | |
| 485: | | | | | | |
| Spillville | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.77 | | |
| 506: | | | | | | |
| Wacousta | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Ponding | 1.00 | Slow refill | 0.30 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.44 | | |
| 507: | | | | | | |
| Canisteo | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.70 | Depth to saturated zone | 1.00 | Slow refill | 0.30 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.19 | | |
| 541C: | | | | | | |
| Estherville | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.45 | Depth to water | 1.00 |
| Hawick | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.50 | Depth to water | 1.00 |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 559: | | | | | | |
| Talcot | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 1.00 |
| | | | Seepage | 0.75 | | |
| 577B: | | | | | | |
| Everly | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.34 | Depth to water | 1.00 |
| 577C2: | | | | | | |
| Everly, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.29 | Depth to water | 1.00 |
| 637D2: | | | | | | |
| Everly, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.29 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| Moneta, moderately eroded | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.72 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| 638C2: | | | | | | |
| Clarion, moderately eroded | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| Storden, moderately eroded | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| 672: | | | | | | |
| May City | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.02 | Depth to water | 1.00 |
| 672B: | | | | | | |
| May City | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.02 | Depth to water | 1.00 |
| 672C2: | | | | | | |
| May City, moderately eroded | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.02 | Depth to water | 1.00 |
| 709: | | | | | | |
| Fairhaven | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.08 | Depth to water | 1.00 |
| 733: | | | | | | |
| Calco | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.05 | | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas: Rating class and limiting features | Value | Embankments, dikes, and levees: Rating class and limiting features | Value | Aquifer-fed excavated ponds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 735: | | | | | | |
| Havelock------------ | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.06 | | |
| | | | Seepage | 0.03 | | |
| 740D: | | | | | | |
| Hawick-------------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.50 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| 810: | | | | | | |
| Galva, terrace------ | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.03 | Depth to water | 1.00 |
| 810B: | | | | | | |
| Galva, terrace------ | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.03 | Depth to water | 1.00 |
| 828B: | | | | | | |
| Zenor--------------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.09 | Depth to water | 1.00 |
| 828C2: | | | | | | |
| Zenor, moderately eroded------------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.09 | Depth to water | 1.00 |
| 835D2: | | | | | | |
| Storden, moderately eroded------------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| Omsrud, moderately eroded------------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| | Slope | 0.01 | | | | |
| 835E2: | | | | | | |
| Storden, moderately eroded------------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| | Slope | 0.04 | | | | |
| Omsrud, moderately eroded------------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.70 | Piping | 1.00 | Depth to water | 1.00 |
| | Slope | 0.04 | | | | |
| 854D: | | | | | | |
| Histosols, fens----- | Somewhat limited | | Not rated | | Not rated | |
| | Slope | 0.03 | | | | |
| 874: | | | | | | |
| Dickinson, lacustrine substratum--------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.36 | Depth to water | 1.00 |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas: Rating class and limiting features | Value | Embankments, dikes, and levees: Rating class and limiting features | Value | Aquifer-fed excavated ponds: Rating class and limiting features | Value |
|---|---|---|---|---|---|---|
| 874B: | | | | | | |
| Dickinson, lacustrine substratum---------- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.36 | Depth to water | 1.00 |
| 874C2: | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded-- | Very limited | | Somewhat limited | | Very limited | |
| | Seepage | 1.00 | Seepage | 0.36 | Depth to water | 1.00 |
| 875: | | | | | | |
| Roine--------------- | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Piping | 1.00 | Depth to water | 1.00 |
| | | | Seepage | 0.01 | | |
| 875B: | | | | | | |
| Roine--------------- | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Piping | 1.00 | Depth to water | 1.00 |
| | | | Seepage | 0.01 | | |
| 875C2: | | | | | | |
| Roine, moderately eroded------------ | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Piping | 1.00 | Depth to water | 1.00 |
| | | | Seepage | 0.01 | | |
| 878: | | | | | | |
| Ocheyedan----------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.99 | Depth to water | 1.00 |
| 878B: | | | | | | |
| Ocheyedan----------- | Somewhat limited | | Very limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.99 | Depth to water | 1.00 |
| 879: | | | | | | |
| Fostoria------------ | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.58 | | |
| 928: | | | | | | |
| Annieville---------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.06 | Depth to water | 1.00 |
| 928B: | | | | | | |
| Annieville---------- | Somewhat limited | | Somewhat limited | | Very limited | |
| | Seepage | 0.72 | Piping | 0.06 | Depth to water | 1.00 |
| 992: | | | | | | |
| Gillett Grove------- | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Ponding | 1.00 | Slow refill | 0.28 |
| | | | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| 1053: | | | | | | |
| Belmann, gypsum phase-------------- | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.04 | Depth to saturated zone | 1.00 | Slow refill | 0.96 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.50 | | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| 1091: | | | | | | |
| McCreath | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Piping | 0.16 | | |
| 1092: | | | | | | |
| Gillett Grove | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| 1133: | | | | | | |
| Colo | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.72 | Depth to saturated zone | 1.00 | Slow refill | 0.28 |
| | | | | | Cutbanks cave | 0.10 |
| 1259: | | | | | | |
| Biscay, depressional | Very limited | | Very limited | | Very limited | |
| | Seepage | 1.00 | Ponding | 1.00 | Cutbanks cave | 1.00 |
| | | | Depth to saturated zone | 1.00 | | |
| | | | Seepage | 0.09 | | |
| 1385: | | | | | | |
| Ocheda | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.05 | Depth to saturated zone | 1.00 | Slow refill | 0.95 |
| | | | | | Cutbanks cave | 0.10 |
| 1508: | | | | | | |
| Belmann | Somewhat limited | | Very limited | | Somewhat limited | |
| | Seepage | 0.04 | Depth to saturated zone | 1.00 | Slow refill | 0.96 |
| | | | | | Cutbanks cave | 0.10 |
| | | | Hard to pack | 0.02 | | |
| 1585: | | | | | | |
| Spillville | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | | | Depth to water | 0.01 |
| | | | Piping | 0.83 | | |
| Coland | Very limited | | Very limited | | Somewhat limited | |
| | Seepage | 1.00 | Depth to saturated zone | 1.00 | Cutbanks cave | 0.10 |
| | | | Piping | 0.24 | | |
| 5010: | | | | | | |
| Pits, sand and gravel | Not rated | | Not rated | | Not rated | |
| 5040: | | | | | | |
| Udorthents, loamy | Not rated | | Not rated | | Not rated | |
| 5060: | | | | | | |
| Pits, clay | Not rated | | Not rated | | Not rated | |
| AW: | | | | | | |
| Animal waste | Not rated | | Not rated | | Not rated | |
| SL: | | | | | | |
| Sewage lagoon | Not rated | | Not rated | | Not rated | |

Table 16.--Water Management--Continued

| Map symbol and component name | Pond reservoir areas | | Embankments, dikes, and levees | | Aquifer-fed excavated ponds | |
|---|---|---|---|---|---|---|
| | Rating class and limiting features | Value | Rating class and limiting features | Value | Rating class and limiting features | Value |
| W: | | | | | | |
| Water | Not rated | | Not rated | | Not rated | |

Table 17.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated)

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 6: | | | | | | | | | | | | |
| Okoboji--------- | 0-6 | Silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-65 | 30-40 |
| | 6-32 | Silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-65 | 30-40 |
| | 32-56 | Silty clay loam, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-65 | 30-40 |
| | 56-60 | Loam, silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 75-90 | 45-55 | 20-30 |
| 27B: | | | | | | | | | | | | |
| Terril---------- | 0-9 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 9-36 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 36-50 | Loam, clay loam | CL | A-7, A-6 | 0 | 0-5 | 95-100 | 90-100 | 70-90 | 60-80 | 30-45 | 10-25 |
| | 50-60 | Clay loam, loam | CL-ML, CL, SC-SM, SC | A-6, A-4 | 0 | 0-5 | 95-100 | 90-100 | 65-95 | 35-85 | 20-40 | 5-20 |
| 27C: | | | | | | | | | | | | |
| Terril---------- | 0-9 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 9-36 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 36-50 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-100 | 70-90 | 60-80 | 30-45 | 10-25 |
| | 50-60 | Loam, clay loam | SC, SC-SM, CL-ML, CL | A-6 | 0 | 0-5 | 95-100 | 90-100 | 65-95 | 35-85 | 20-40 | 5-20 |
| 27D: | | | | | | | | | | | | |
| Terril---------- | 0-9 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 9-36 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 36-50 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-100 | 70-90 | 60-80 | 30-45 | 10-25 |
| | 50-60 | Clay loam, loam | CL, CL-ML, SC, SC-SM | A-6 | 0 | 0-5 | 95-100 | 90-100 | 65-95 | 35-85 | 20-40 | 5-20 |
| 31: | | | | | | | | | | | | |
| Afton----------- | 0-7 | Silty clay loam | MH | A-7 | 0 | 0 | 100 | 100 | 100 | 95-100 | 50-65 | 20-35 |
| | 7-32 | Silty clay loam | MH | A-7 | 0 | 0 | 100 | 100 | 100 | 95-100 | 50-65 | 20-35 |
| | 32-43 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 100 | 95-100 | 40-60 | 20-35 |
| | 51-65 | Clay loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 80-100 | 60-90 | 35-50 | 20-30 |
| | 65-80 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-95 | 75-85 | 60-80 | 30-40 | 10-20 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 34B: | | | | | | | | | | | | |
| Estherville----- | 0-7 | Sandy loam | SM, SC, SC-SM | A-2, A-4 | 0 | 0-5 | 90-100 | 80-100 | 50-75 | 25-50 | 20-30 | 2-10 |
| | 7-18 | Sandy loam, loam, coarse sandy loam | SM, SC-SM, SC | A-1, A-4, A-2 | 0 | 0-5 | 85-100 | 80-95 | 40-75 | 15-45 | 20-30 | 2-8 |
| | 18-80 | Gravelly coarse sand, very gravelly sand, loamy coarse sand | SP, SM, GP, SP-SM | A-1 | 0 | 0-10 | 55-90 | 50-85 | 10-40 | 2-25 | --- | NP |
| 41C: | | | | | | | | | | | | |
| Sparta---------- | 0-11 | Loamy sand | SM | A-2 | 0 | 0 | 85-100 | 85-100 | 35-95 | 15-50 | 0-14 | NP |
| | 11-15 | Loamy fine sand, loamy sand | SM | A-2 | 0 | 0 | 85-100 | 85-100 | 50-95 | 5-50 | 0-14 | NP |
| | 15-60 | Fine sand, sand | SM | A-2 | 0 | 0 | 85-100 | 85-100 | 50-95 | 2-30 | 0-14 | NP |
| 48: | | | | | | | | | | | | |
| Knoke----------- | 0-8 | Mucky silty clay loam | CH, MH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-70 | 25-40 |
| | 8-15 | Silty clay loam | CH, MH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-70 | 25-40 |
| | 15-39 | Silty clay loam, mucky silty clay loam | MH, OH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-90 | 15-40 |
| | 39-80 | Silty clay, silty clay loam, clay loam, loam | CH, MH | A-7 | 0 | 0 | 95-100 | 95-100 | 90-100 | 80-95 | 55-70 | 25-40 |
| 54: | | | | | | | | | | | | |
| Zook------------ | 0-6 | Silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 45-65 | 20-35 |
| | 6-20 | Silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 45-65 | 20-35 |
| | 20-60 | Silty clay, silty clay loam | CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 60-85 | 35-55 |
| 55: | | | | | | | | | | | | |
| Nicollet-------- | 0-10 | Loam | CL | A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 75-90 | 55-80 | 25-40 | 5-15 |
| | 10-17 | Clay loam, loam | CL | A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 75-90 | 55-80 | 25-40 | 5-15 |
| | 17-36 | Clay loam, loam | CL | A-6 | 0-1 | 0-5 | 90-100 | 90-100 | 75-90 | 50-80 | 25-40 | 5-15 |
| | 36-60 | Loam, sandy loam | CL-ML, SC-SM, SC, CL | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 62F: | | | | | | | | | | | | |
| Storden--------- | 0-7 | Loam | CL, ML | A-4, A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-85 | 55-70 | 30-40 | 5-15 |
| | 7-55 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 95-100 | 85-97 | 70-85 | 55-70 | 20-40 | 5-15 |
| | 55-80 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 77B: | | | | | | | | | | | | |
| Sac------------- | 0-6 | Silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 6-16 | Silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 16-32 | Clay loam, silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 32-80 | Clay loam | CL, CL-ML | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 25-40 | 5-20 |
| 77C: | | | | | | | | | | | | |
| Sac------------- | 0-6 | Silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 6-16 | Silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 16-32 | Clay loam, silty clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 32-80 | Clay loam | CL, CL-ML | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 25-40 | 5-20 |
| 77C2: | | | | | | | | | | | | |
| Sac, moderately eroded--------- | 0-7 | Silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 7-30 | Clay loam, silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 30-80 | Clay loam | CL, CL-ML | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 25-40 | 5-20 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 90: | | | | | | | | | | | | |
| Okoboji mucky silty clay loam | 0-8 | Mucky silty clay loam | MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 60-90 | 10-30 |
| | 8-20 | Silty clay loam, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-65 | 30-40 |
| | 20-40 | Silty clay loam, silty clay | CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 80-95 | 55-65 | 30-40 |
| | 40-60 | Loam, silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 75-90 | 45-55 | 20-30 |
| 95: | | | | | | | | | | | | |
| Harps----------- | 0-8 | Loam | CH, CL | A-7, A-6 | 0 | 0-5 | 95-100 | 95-100 | 80-90 | 65-80 | 35-55 | 15-35 |
| | 8-16 | Loam, clay loam | CH, CL | A-7, A-6 | 0 | 0-5 | 95-100 | 95-100 | 80-90 | 65-80 | 30-60 | 15-35 |
| | 16-42 | Loam, clay loam | CH, CL | A-7, A-6 | 0 | 0-5 | 95-100 | 95-100 | 80-90 | 65-80 | 30-60 | 15-35 |
| | 42-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 107: | | | | | | | | | | | | |
| Webster--------- | 0-8 | Silty clay loam | CH, CL | A-7, A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 85-95 | 70-90 | 35-60 | 15-30 |
| | 8-16 | Silty clay loam | CH, CL | A-7, A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 85-95 | 70-90 | 35-60 | 15-30 |
| | 16-32 | Clay loam, loam | CL | A-7, A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 85-95 | 60-80 | 35-50 | 15-30 |
| | 32-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 108: | | | | | | | | | | | | |
| Wadena---------- | 0-7 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 7-11 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 11-26 | Loam | SM, ML, CL, SC | A-4 | 0 | 0 | 95-100 | 80-100 | 75-95 | 40-60 | 25-40 | 5-12 |
| | 26-80 | Stratified very gravelly coarse sand to sand | GP, GP-GM, SP, SP-SM | A-1 | 0-3 | 0-5 | 45-100 | 35-100 | 10-80 | 2-10 | --- | NP |
| 108B: | | | | | | | | | | | | |
| Wadena---------- | 0-7 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 7-10 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 10-25 | Loam | SM, ML, CL, SC | A-4 | 0 | 0 | 95-100 | 80-100 | 75-95 | 40-60 | 25-40 | 5-12 |
| | 25-80 | Stratified very gravelly coarse sand to sand | SP-SM, GP, GP-GM, SP | A-1 | 0-3 | 0-5 | 45-100 | 35-100 | 10-80 | 2-10 | --- | NP |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 133: | | | | | | | | | | | | |
| Colo | 0-8 | Silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-60 | 15-30 |
| | 8-34 | Silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-60 | 15-30 |
| | 34-52 | Silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-55 | 20-30 |
| | 52-60 | Silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 40-55 | 15-30 |
| 135: | | | | | | | | | | | | |
| Coland | 0-8 | Clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 8-32 | Silty clay loam, clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 32-40 | Clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 40-60 | Loam, sandy loam, sandy clay loam | CL-ML, CL, SC-SM, SC | A-6, A-4 | 0 | 0 | 100 | 90-100 | 60-70 | 40-60 | 20-40 | 5-15 |
| 138B: | | | | | | | | | | | | |
| Clarion | 0-7 | Loam | CL-ML, CL | A-4, A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 7-18 | Loam | CL-ML, CL | A-4, A-6 | 0-1 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 18-36 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 36-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 138C2: | | | | | | | | | | | | |
| Clarion, moderately eroded | 0-7 | Loam | CL, CL-ML | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 7-16 | Loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 16-35 | Loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 35-60 | Loam, sandy loam | CL, CL-ML, SC, SC-SM | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 175: | | | | | | | | | | | | |
| Dickinson | 0-9 | Fine sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 9-18 | Fine sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 18-30 | Fine sandy loam, sandy loam | SM, SC-SM, SC | A-4 | 0 | 0 | 100 | 100 | 85-95 | 35-50 | 15-30 | NP-10 |
| | 30-36 | Loamy sand, loamy fine sand, fine sand | SM, SC-SM | A-3, A-2 | 0 | 0 | 100 | 100 | 80-95 | 5-20 | 10-20 | NP-5 |
| | 36-60 | Sand | SM | A-3, A-2 | 0 | 0 | 100 | 100 | 70-90 | 5-20 | 0-14 | NP |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 175B: | | | | | | | | | | | | |
| Dickinson------- | 0-9 | Fine sandy loam | SM, SC, SC-SM | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 9-18 | Fine sandy loam, sandy loam | SC, SM, SC-SM | A-4 | 0 | 0 | 100 | 100 | 85-95 | 35-50 | 15-30 | NP-10 |
| | 18-30 | Fine sandy loam, sandy loam | SC, SM, SC-SM | A-4 | 0 | 0 | 100 | 100 | 85-95 | 35-50 | 15-30 | NP-10 |
| | 30-36 | Loamy sand, loamy fine sand, fine sand | SM, SC-SM | A-3, A-2 | 0 | 0 | 100 | 100 | 80-95 | 5-20 | 10-20 | NP-5 |
| | 36-60 | Sand, loamy fine sand | SM | A-3, A-2 | 0 | 0 | 100 | 100 | 70-90 | 5-20 | 0-14 | NP |
| 191: | | | | | | | | | | | | |
| Rushmore-------- | 0-8 | Silty clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 8-18 | Silty clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 18-28 | Silty clay loam | CL | A-7 | 0 | 0 | 95-100 | 90-100 | 85-95 | 75-85 | 40-50 | 15-25 |
| | 28-62 | Clay loam, loam | ML | A-6 | --- | 0-5 | 95-100 | 85-100 | 85-95 | 65-75 | 30-50 | 7-25 |
| 201B: | | | | | | | | | | | | |
| Coland---------- | 0-8 | Clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 8-32 | Silty clay loam, clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 32-40 | Clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 40-60 | Loam, sandy loam, sandy clay loam | CL-ML, CL, SC-SM, SC | A-6, A-4 | 0 | 0 | 100 | 90-100 | 60-70 | 40-60 | 20-40 | 5-15 |
| Terril---------- | 0-9 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 9-36 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-90 | 60-80 | 30-40 | 10-20 |
| | 36-50 | Loam, clay loam | CL | A-7, A-6 | 0 | 0-5 | 95-100 | 90-100 | 70-90 | 60-80 | 30-45 | 10-25 |
| | 50-60 | Clay loam, loam, sandy loam | SC-SM, SC, CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 90-100 | 65-95 | 35-85 | 20-40 | 5-20 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 202: | | | | | | | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | 0-8 | Loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 80-100 | 50-75 | 30-40 | 10-20 |
| | 8-18 | Loam, clay loam | CL, SC | A-6 | 0 | 0 | 95-100 | 80-100 | 80-95 | 45-70 | 30-40 | 10-20 |
| | 18-28 | Clay loam | CL | A-6 | 0 | 0 | 95-100 | 80-100 | 80-95 | 45-70 | 30-40 | 10-20 |
| | 28-80 | Gravelly sandy loam, gravelly sand | SP-SM, SM | A-1 | 0 | 0-10 | 65-95 | 65-95 | 20-55 | 5-25 | 0-14 | NP |
| 203: | | | | | | | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | 0-8 | Loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 80-100 | 50-75 | 30-40 | 10-20 |
| | 8-18 | Clay loam, loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 80-100 | 50-75 | 30-40 | 10-20 |
| | 18-28 | Loam, clay loam | SC, CL | A-6 | 0 | 0 | 95-100 | 80-100 | 80-95 | 45-70 | 30-40 | 10-20 |
| | 28-80 | Coarse sand, very gravelly loamy sand, loamy sand | SM, SP-SM | A-1, A-3, A-2 | 0 | 0-10 | 65-95 | 65-95 | 20-55 | 5-25 | 0-14 | NP |
| 221: | | | | | | | | | | | | |
| Klossner-------- | 0-10 | Muck | PT | A-1 | 0 | 0 | 100 | 100 | --- | --- | --- | --- |
| | 10-26 | Muck | PT | A-1 | 0 | 0 | 100 | 100 | --- | --- | --- | --- |
| | 26-48 | Mucky silty clay loam, clay loam, silty clay loam, fine sandy loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 85-100 | 80-100 | 70-95 | 50-90 | 25-40 | 5-20 |
| | 48-80 | Clay loam, silty clay loam, fine sandy loam | CL, CL-ML | A-4, A-6 | 0 | 0 | 85-100 | 80-100 | 70-95 | 50-90 | 25-40 | 5-20 |
| 259: | | | | | | | | | | | | |
| Biscay---------- | 0-7 | Clay loam | ML, CL | A-6, A-7 | 0 | 0 | 95-100 | 95-100 | 70-95 | 50-80 | 35-50 | 10-25 |
| | 7-20 | Loam, clay loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 95-100 | 70-95 | 50-80 | 35-50 | 10-25 |
| | 20-36 | Loam, clay loam, sandy clay loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 90-100 | 70-90 | 50-75 | 30-50 | 10-20 |
| | 36-80 | Stratified very gravelly coarse sand to loamy sand | SP, SP-SM, GP-GM, GP | A-1 | 0 | 0-5 | 45-95 | 35-95 | 20-45 | 2-10 | --- | NP |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 274: | | | | | | | | | | | | |
| Rolfe----------- | 0-10 | Silt loam | OL, CL, ML | A-6, A-4 | 0 | 0 | 100 | 95-100 | 90-100 | 80-95 | 30-40 | 5-15 |
| | 10-21 | Silt loam | OL, CL, ML | A-6, A-4 | 0 | 0 | 100 | 95-100 | 90-100 | 80-95 | 30-40 | 5-15 |
| | 21-55 | Clay, silty clay, clay loam | CH | A-7 | 0 | 0 | 100 | 95-100 | 90-100 | 75-95 | 50-65 | 25-35 |
| | 55-80 | Clay loam, loam | CL | A-6, A-7 | 0 | 0 | 95-100 | 90-100 | 80-90 | 55-75 | 30-45 | 10-20 |
| 282: | | | | | | | | | | | | |
| Ransom---------- | 0-8 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-95 | 40-50 | 10-20 |
| | 8-16 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-95 | 40-50 | 10-20 |
| | 16-33 | Silty clay loam | ML | A-7 | 0 | 0 | 95-100 | 90-100 | 85-100 | 75-95 | 35-50 | 10-20 |
| | 33-80 | Clay loam, loam | ML, CL | A-4 | --- | 0-5 | 95-100 | 85-100 | 75-95 | 55-80 | 30-40 | 5-15 |
| 308: | | | | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel----- | 0-8 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 8-13 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 13-34 | Loam, sandy loam, sandy clay loam | SC, SM, CL, ML | A-6, A-4 | 0 | 0 | 95-100 | 80-100 | 75-95 | 40-60 | 25-40 | 5-12 |
| | 34-60 | Stratified very gravelly coarse sand to sand | GP-GM, SP, GP, SP-SM | A-2, A-1, A-3 | 0-3 | 0-5 | 45-100 | 35-100 | 10-80 | 2-10 | 0-14 | NP |
| 308B: | | | | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel----- | 0-8 | Loam | ML | A-4 | 0 | 0 | 95-100 | 90-100 | 75-95 | 50-65 | 25-40 | 2-10 |
| | 8-13 | Loam | SM, SC, CL, ML | A-4, A-6 | 0 | 0 | 95-100 | 80-100 | 75-95 | 40-60 | 25-40 | 5-12 |
| | 13-34 | Loam, sandy loam, sandy clay loam | SM, SC, CL, ML | A-4, A-6 | 0 | 0 | 95-100 | 80-100 | 75-95 | 40-60 | 25-40 | 5-12 |
| | 34-60 | Stratified very gravelly coarse sand to sand | GP-GM, SP-SM, SP, GP | A-1, A-3, A-2 | 0-3 | 0-5 | 45-100 | 35-100 | 10-80 | 2-10 | 0-14 | NP |
| 354. | | | | | | | | | | | | |
| Aquolls (marsh), ponded | | | | | | | | | | | | |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 375: | | | | | | | | | | | | |
| Fostoria, lacustrine substratum----- | 0-7 | Clay loam | CL | A-4 | 0 | 0 | 100 | 100 | 95-100 | 80-95 | 25-40 | 5-15 |
| | 7-19 | Loam | CL | A-6 | 0 | 0-5 | 100 | 100 | 75-100 | 55-95 | 30-40 | 10-20 |
| | 19-46 | Loam | CL | A-6 | 0 | 0-5 | 100 | 100 | 75-100 | 55-95 | 30-40 | 10-20 |
| | 46-52 | Silty clay, silty clay loam | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| | 52-80 | Silty clay loam, silty clay, clay | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| 376F: | | | | | | | | | | | | |
| Cornell--------- | 0-6 | Clay loam, silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 6-21 | Clay loam, silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 21-43 | Clay loam, silty clay, clay | CL | A-6 | 0 | 0-5 | 90-95 | 85-95 | 70-85 | 55-75 | 30-40 | 15-25 |
| | 43-80 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 90-95 | 85-95 | 70-85 | 55-75 | 35-45 | 15-25 |
| 379: | | | | | | | | | | | | |
| Ocheyedan, lacustrine substratum----- | 0-7 | Clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 7-14 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 14-40 | Fine sandy loam, sandy clay loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 60-80 | 35-55 | 25-40 | 5-15 |
| | 40-60 | Silt loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-90 | 25-40 | 5-15 |
| | 60-80 | Silty clay | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 379B: Ocheyedan, lacustrine substratum | 0-7 | Clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 7-14 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 14-40 | Fine sandy loam, sandy clay loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 60-80 | 35-55 | 25-40 | 5-15 |
| | 40-60 | Silt loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-90 | 25-40 | 5-15 |
| | 60-80 | Silty clay | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| 379C2: Ocheyedan, lacustrine substratum, moderately eroded | 0-8 | Clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 8-40 | Fine sandy loam, sandy clay loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 60-80 | 35-55 | 25-40 | 5-15 |
| | 40-60 | Silt loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-90 | 25-40 | 5-15 |
| | 60-80 | Silty clay | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| 384: Collinwood | 0-7 | Clay, silty clay | CL, ML, CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-55 | 15-25 |
| | 7-15 | Silty clay loam, silty clay | CL, CH, ML, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-55 | 15-25 |
| | 15-33 | Clay loam, silty clay, sandy clay loam | MH, CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 50-65 | 20-35 |
| | 33-60 | Silty clay, clay, silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-60 | 15-30 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 390: | | | | | | | | | | | | |
| Waldorf--------- | 0-9 | Silty clay, silty clay loam | ML, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 45-65 | 14-30 |
| | 9-28 | Silty clay loam, silty clay | MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 45-65 | 14-30 |
| | 28-45 | Clay, silty clay | MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 50-70 | 20-35 |
| | 45-80 | Silty clay | MH, CL, ML, CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 35-65 | 11-30 |
| 397: | | | | | | | | | | | | |
| Letri----------- | 0-8 | Clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 8-18 | Clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 18-32 | Gravelly sandy loam | CL | A-7 | 0 | 0 | 95-100 | 90-100 | 85-95 | 75-85 | 40-50 | 15-25 |
| | 32-60 | Silty clay loam, clay loam | CL, ML | A-6 | --- | 0-5 | 95-100 | 85-100 | 85-95 | 65-75 | 30-50 | 7-25 |
| 433E: | | | | | | | | | | | | |
| Moneta---------- | 0-9 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-98 | 80-95 | 65-80 | 36-39 | 15-18 |
| | 9-60 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| | 60-80 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| 433F: | | | | | | | | | | | | |
| Moneta---------- | 0-9 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-98 | 80-95 | 65-80 | 36-39 | 15-18 |
| | 9-60 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| | 60-80 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| 433G: | | | | | | | | | | | | |
| Moneta---------- | 0-9 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-98 | 80-95 | 65-80 | 36-39 | 15-18 |
| | 9-60 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| | 60-80 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| 455: | | | | | | | | | | | | |
| Wilmonton------- | 0-8 | Clay loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 85-100 | 60-90 | 30-50 | 12-25 |
| | 8-17 | Clay loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 85-100 | 60-90 | 30-50 | 12-25 |
| | 17-25 | Loam, clay loam | CL | A-6 | --- | 0-5 | 95-100 | 85-100 | 80-90 | 60-80 | 30-50 | 15-25 |
| | 25-55 | Clay loam, loam | CL | A-6 | --- | 0-5 | 95-100 | 85-100 | 75-85 | 55-75 | 25-40 | 10-25 |
| | 55-80 | Clay loam | CL | A-6 | --- | 0-5 | 95-100 | 85-100 | 75-85 | 55-75 | 25-40 | 10-25 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 456: | | | | | | | | | | | | |
| Wilmonton------- | 0-8 | Silty clay loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 85-100 | 60-90 | 30-50 | 12-25 |
| | 8-14 | Silty clay loam | CL | A-6 | 0 | 0 | 100 | 90-100 | 85-100 | 60-90 | 30-50 | 12-25 |
| | 14-35 | Clay loam | CL | A-6 | --- | 0-5 | 95-100 | 85-100 | 80-90 | 60-80 | 30-50 | 15-25 |
| | 35-80 | Clay loam | CL | A-6 | --- | 0-5 | 95-100 | 85-100 | 75-85 | 55-75 | 25-40 | 10-25 |
| 485: | | | | | | | | | | | | |
| Spillville------ | 0-20 | Loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 60-80 | 25-40 | 10-20 |
| | 20-54 | Loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 60-80 | 25-40 | 10-20 |
| | 54-80 | Sandy clay loam, loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 80-90 | 35-75 | 20-40 | 5-15 |
| 506: | | | | | | | | | | | | |
| Wacousta-------- | 0-9 | Silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 40-65 | 20-40 |
| | 9-14 | Silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 95-100 | 40-65 | 20-40 |
| | 14-16 | Silty clay loam, silt loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-60 | 20-35 |
| | 16-60 | Silt loam, silty clay loam | ML, CL | A-4, A-6 | 0 | 0-5 | 95-100 | 95-100 | 85-100 | 80-90 | 30-40 | 5-15 |
| 507: | | | | | | | | | | | | |
| Canisteo-------- | 0-10 | Clay loam | ML, OL | A-7 | 0 | 0 | 95-100 | 95-100 | 85-100 | 60-100 | 40-50 | 15-20 |
| | 10-18 | Clay loam | ML, OL | A-7 | 0 | 0 | 95-100 | 95-100 | 85-100 | 60-100 | 40-50 | 15-20 |
| | 18-39 | Clay loam, loam, silty clay loam | CL | A-7, A-6 | 0 | 0 | 98-100 | 90-100 | 85-95 | 65-85 | 38-50 | 25-35 |
| | 39-80 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 541C: | | | | | | | | | | | | |
| Estherville----- | 0-7 | Sandy loam | SM, SC, SC-SM | A-2, A-4 | 0 | 0-5 | 90-100 | 80-100 | 50-75 | 25-50 | 20-30 | 2-10 |
| | 7-18 | Sandy loam, loam, coarse sandy loam | SM, SC-SM, SC | A-1, A-4, A-2 | 0 | 0-5 | 85-100 | 80-95 | 40-75 | 15-45 | 20-30 | 2-8 |
| | 18-80 | Gravelly coarse sand, very gravelly sand, loamy coarse sand | SP, SM, GP, SP-SM | A-1 | 0 | 0-10 | 55-90 | 50-85 | 10-40 | 2-25 | --- | NP |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 541C: | | | | | | | | | | | | |
| Hawick---------- | 0-7 | Gravelly loamy sand | SM | A-2 | 0-2 | 0-5 | 85-100 | 80-95 | 50-65 | 25-35 | 0-20 | NP-4 |
| | 7-11 | Gravelly loamy sand, gravelly coarse sand, loamy sand | SP-SM, SM | A-1, A-2, A-3 | 0-2 | 0-5 | 75-95 | 60-95 | 35-70 | 5-25 | 0-14 | NP |
| | 11-73 | Gravelly coarse sand, gravelly sand, coarse sand, sand | SP, SP-SM | A-1, A-3, A-2 | 0-2 | 0-5 | 60-95 | 50-95 | 30-65 | 2-10 | 0-14 | NP |
| 559: | | | | | | | | | | | | |
| Talcot---------- | 0-10 | Clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 80-90 | 60-85 | 40-50 | 15-25 |
| | 10-26 | Silty clay loam, clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 80-90 | 60-85 | 40-50 | 15-25 |
| | 26-30 | Silty clay loam, clay loam | CL | A-7 | 0 | 0 | 95-100 | 85-100 | 70-90 | 60-85 | 40-50 | 15-25 |
| | 30-60 | Loamy coarse sand, gravelly sand | SP-SM | A-1 | 0 | 0 | 65-90 | 50-85 | 20-50 | 2-10 | 0-14 | NP |
| 577B: | | | | | | | | | | | | |
| Everly---------- | 0-8 | Clay loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 65-80 | 30-45 | 10-20 |
| | 8-12 | Clay loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 65-80 | 30-45 | 10-20 |
| | 12-26 | Loam, clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 85-95 | 70-90 | 35-50 | 15-25 |
| | 26-80 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-95 | 75-85 | 60-80 | 30-40 | 10-20 |
| 577C2: | | | | | | | | | | | | |
| Everly, moderately eroded--------- | 0-7 | Clay loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 65-80 | 30-45 | 10-20 |
| | 7-26 | Clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 85-95 | 70-90 | 35-50 | 15-25 |
| | 26-80 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-95 | 75-85 | 60-80 | 30-40 | 10-20 |
| 637D2: | | | | | | | | | | | | |
| Everly, moderately eroded--------- | 0-7 | Clay loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 65-80 | 30-45 | 10-20 |
| | 7-26 | Loam, clay loam | CL | A-7 | 0 | 0 | 95-100 | 95-100 | 85-95 | 70-90 | 35-50 | 15-25 |
| | 26-80 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-95 | 75-85 | 60-80 | 30-40 | 10-20 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 637D2: | | | | | | | | | | | | |
| Moneta, moderately eroded--------- | 0-7 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-98 | 80-95 | 65-80 | 36-39 | 15-18 |
| | 7-57 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| | 57-80 | Clay loam, loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-95 | 55-70 | 28-39 | 9-18 |
| 638C2: | | | | | | | | | | | | |
| Clarion, moderately eroded--------- | 0-7 | Loam | CL, CL-ML | A-4, A-6 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 7-16 | Loam, silt loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 16-35 | Loam, silt loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 35-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-6, A-4 | 0 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| Storden, moderately eroded--------- | 0-7 | Loam | CL, ML | A-4, A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-85 | 55-70 | 30-40 | 5-15 |
| | 7-11 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 95-100 | 85-97 | 70-85 | 55-70 | 20-40 | 5-15 |
| | 11-80 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 672: | | | | | | | | | | | | |
| May City-------- | 0-7 | Sandy clay loam, loam | SM | A-4, A-2 | 0 | 0 | 95-100 | 90-100 | 55-70 | 25-40 | 15-26 | 2-7 |
| | 7-19 | Sandy clay loam, loam | SM, SC, CL, ML | A-4, A-2 | 0 | 0 | 95-100 | 85-100 | 50-95 | 25-75 | 15-30 | 2-10 |
| | 19-80 | Extremely gravelly sandy loam, very gravelly sandy loam | SP | A-1 | 0 | 0 | 50-85 | 45-85 | 20-35 | 1-5 | 0-14 | NP |
| 672B: | | | | | | | | | | | | |
| May City-------- | 0-7 | Sandy clay loam, loam | SM | A-4, A-2 | 0 | 0 | 95-100 | 90-100 | 55-70 | 25-40 | 15-26 | 2-7 |
| | 7-19 | Sandy clay loam, loam | SM, SC, CL, ML | A-4, A-2 | 0 | 0 | 95-100 | 85-100 | 50-95 | 25-75 | 15-30 | 2-10 |
| | 19-80 | Extremely gravelly sandy loam, very gravelly sandy loam | SP | A-1 | 0 | 0 | 50-85 | 45-85 | 20-35 | 1-5 | 0-14 | NP |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 672C2: May City, moderately eroded--------- | 0-7 | Sandy clay loam, loam | SM | A-4, A-2 | 0 | 0 | 95-100 | 90-100 | 55-70 | 25-40 | 15-26 | 2-7 |
| | 7-17 | Sandy clay loam, loam | SM, SC, CL, ML | A-4, A-2 | 0 | 0 | 95-100 | 85-100 | 50-95 | 25-75 | 15-30 | 2-10 |
| | 17-80 | Extremely gravelly sandy loam, very gravelly sandy loam | SP | A-1 | 0 | 0 | 50-85 | 45-85 | 20-35 | 1-5 | 0-14 | NP |
| 709: Fairhaven------- | 0-9 | Silt loam | ML | A-4 | 0 | 0 | 95-100 | 95-100 | 80-95 | 60-85 | 25-40 | NP-15 |
| | 9-25 | Silt loam | ML | A-4 | 0 | 0 | 95-100 | 95-100 | 80-95 | 60-85 | 25-40 | NP-15 |
| | 25-30 | Sandy loam, clay loam, loam | ML | A-4 | 0 | 0 | 95-100 | 95-100 | 80-95 | 60-85 | 25-40 | 2-15 |
| | 30-80 | Gravelly loamy sand | SP-SM | A-1 | 0 | 0-5 | 50-100 | 35-100 | 20-50 | 1-10 | --- | NP |
| 733: Calco----------- | 0-9 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 40-60 | 15-30 |
| | 9-27 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 40-60 | 15-30 |
| | 27-36 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 40-60 | 15-30 |
| | 36-80 | Silt loam, silty clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 90-100 | 80-100 | 30-45 | 10-20 |
| 735: Havelock-------- | 0-9 | Clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 65-85 | 45-55 | 20-30 |
| | 9-40 | Clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 65-85 | 45-55 | 20-30 |
| | 40-73 | Sandy loam, loam | CL | A-4 | 0 | 0 | 100 | 90-100 | 60-70 | 40-60 | 20-40 | 5-15 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 740D: | | | | | | | | | | | | |
| Hawick---------- | 0-7 | Gravelly loamy sand | SM | A-2 | 0-2 | 0-5 | 85-100 | 80-95 | 50-65 | 25-35 | 0-20 | NP-4 |
| | 7-11 | Gravelly loamy sand, gravelly coarse sand, loamy sand | SP-SM | A-1, A-2, A-3 | 0-2 | 0-5 | 75-95 | 60-95 | 35-70 | 5-25 | 0-14 | NP |
| | 11-73 | Gravelly coarse sand, gravelly sand, coarse sand, sand | SP, SP-SM | A-1, A-3, A-2 | 0-2 | 0-5 | 60-95 | 50-95 | 30-65 | 2-10 | 0-14 | NP |
| 810: | | | | | | | | | | | | |
| Galva, terrace-- | 0-6 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 6-17 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 17-31 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 31-45 | Silt loam, silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| | 45-60 | Silt loam | CL | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 30-40 | 10-20 |
| 810B: | | | | | | | | | | | | |
| Galva, terrace-- | 0-6 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 6-17 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 17-31 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 31-45 | Silty clay loam, silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| | 45-60 | Silt loam | CL | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 30-40 | 10-20 |
| 828B: | | | | | | | | | | | | |
| Zenor----------- | 0-8 | Sandy loam | SC-SM, SC | A-4, A-2 | 0 | 0-5 | 85-95 | 80-95 | 60-70 | 25-40 | 15-25 | 5-10 |
| | 8-33 | Sandy loam, loam | SC-SM, SC | A-4, A-2 | 0 | 0-5 | 85-95 | 80-95 | 50-70 | 25-40 | 15-25 | 5-10 |
| | 33-60 | Sand, gravelly loamy sand, gravelly sand, loamy sand | SW, SP-SM, SP | A-1 | 0 | 0-5 | 85-95 | 80-90 | 20-40 | 3-12 | 15-20 | NP-5 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 828C2: | | | | | | | | | | | | |
| Zenor, moderately eroded--------- | 0-8 | Sandy loam | SC-SM, SC | A-2, A-4 | 0 | 0-5 | 85-95 | 80-95 | 60-70 | 25-40 | 15-25 | 5-10 |
| | 8-30 | Sandy loam, loam | SC-SM, SC | A-2, A-4 | 0 | 0-5 | 85-95 | 80-95 | 50-70 | 25-40 | 15-25 | 5-10 |
| | 30-60 | Sand, gravelly loamy sand, gravelly sand, loamy sand | SW, SP, SP-SM | A-1 | 0 | 0-5 | 85-95 | 80-90 | 20-40 | 3-12 | 15-20 | NP-5 |
| 835D2: | | | | | | | | | | | | |
| Storden, moderately eroded--------- | 0-7 | Loam | CL, ML | A-4, A-6 | 0 | 0-5 | 95-100 | 95-100 | 70-85 | 55-70 | 30-40 | 5-15 |
| | 7-11 | Loam, clay loam | CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 95-100 | 85-97 | 70-85 | 55-70 | 20-40 | 5-15 |
| | 11-80 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| Omsrud, moderately eroded--------- | 0-7 | Loam | CL, CL-ML | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 7-24 | Loam, silt loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 24-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-6, A-4 | 0 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 835E2: | | | | | | | | | | | | |
| Storden, moderately eroded--------- | 0-7 | Loam | CL | A-6 | 0 | 0-5 | 95-100 | 95-98 | 70-85 | 55-70 | 28-36 | 9-15 |
| | 7-11 | Loam, sandy loam | CL | A-6 | 0 | 0-5 | 95-100 | 90-98 | 70-85 | 55-70 | 25-35 | 8-15 |
| | 11-80 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0-1 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| Omsrud, moderately eroded--------- | 0-7 | Loam | CL, CL-ML | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 7-24 | Loam, silt loam | CL-ML, CL | A-6, A-4 | 0 | 0-5 | 95-100 | 95-100 | 75-90 | 50-75 | 25-40 | 5-15 |
| | 24-60 | Loam, sandy loam | SC-SM, SC, CL, CL-ML | A-6, A-4 | 0 | 0-5 | 90-100 | 85-100 | 75-90 | 45-70 | 25-40 | 5-15 |
| 854D. | | | | | | | | | | | | |
| Histosols, fens | | | | | | | | | | | | |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number-- | | | | Liquid limit | Plas- ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | Pct | | | | | Pct | |
| 874: Dickinson, lacustrine substratum----- | 0-9 | Sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 9-30 | Fine sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 30-36 | Loamy sand, loamy fine sand, fine sand | SC-SM | A-3, A-2 | 0 | 0 | 100 | 100 | 80-95 | 5-20 | 10-20 | NP-5 |
| | 36-67 | Sand | SM | A-3, A-2 | 0 | 0 | 100 | 100 | 70-90 | 5-20 | 0-14 | NP |
| | 67-80 | Silty clay loam, silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| 874B: Dickinson, lacustrine substratum----- | 0-9 | Sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 9-30 | Fine sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 30-36 | Loamy sand, loamy fine sand, fine sand | SC-SM | A-3, A-2 | 0 | 0 | 100 | 100 | 80-95 | 5-20 | 10-20 | NP-5 |
| | 36-67 | Sand | SM | A-3, A-2 | 0 | 0 | 100 | 100 | 70-90 | 5-20 | 0-14 | NP |
| | 67-80 | Silty clay loam, silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| 874C2: Dickinson, lacustrine substratum, moderately eroded--------- | 0-8 | Sandy loam | SM, SC-SM, SC | A-2, A-4 | 0 | 0 | 100 | 100 | 85-95 | 30-50 | 15-30 | NP-10 |
| | 8-30 | Fine sandy loam, sandy loam | SM, SC-SM, SC | A-4 | 0 | 0 | 100 | 100 | 85-95 | 35-50 | 15-30 | NP-10 |
| | 30-36 | Loamy sand, loamy fine sand, fine sand | SC-SM | A-3, A-2 | 0 | 0 | 100 | 100 | 80-95 | 5-20 | 10-20 | NP-5 |
| | 36-67 | Sand | SM | A-3, A-2 | 0 | 0 | 100 | 100 | 70-90 | 5-20 | 0-14 | NP |
| | 67-80 | Silt loam, silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 875: | | | | | | | | | | | | |
| Roine----------- | 0-8 | Fine sandy loam, sandy loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 8-48 | Fine sandy loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 48-52 | Loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| | 52-59 | Silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| | 59-80 | Clay loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| 875B: | | | | | | | | | | | | |
| Roine----------- | 0-8 | Fine sandy loam, sandy loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 8-48 | Fine sandy loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 48-52 | Loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| | 52-59 | Silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| | 59-80 | Clay loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| 875C2: | | | | | | | | | | | | |
| Roine, moderately eroded--------- | 0-8 | Fine sandy loam, sandy loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 8-45 | Fine sandy loam | SC | A-4 | 0 | 0 | 100 | 100 | 80-95 | 30-50 | 15-30 | NP-10 |
| | 45-52 | Loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| | 52-59 | Silt loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 85-100 | 35-50 | 15-25 |
| | 59-80 | Clay loam | CL | A-6 | 0 | 2-5 | 90-95 | 85-95 | 80-90 | 55-65 | 25-35 | 11-20 |
| 878: | | | | | | | | | | | | |
| Ocheyedan------- | 0-7 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 7-14 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 14-34 | Fine sandy loam, sandy clay loam, loam | SC | A-4 | 0 | 0 | 100 | 100 | 60-80 | 35-55 | 25-40 | 5-15 |
| | 34-60 | Clay loam, silt loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-90 | 25-40 | 5-15 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 878B: | | | | | | | | | | | | |
| Ocheyedan------- | 0-7 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 7-14 | Loam | CL | A-6 | 0 | 0 | 100 | 100 | 75-90 | 65-80 | 30-40 | 10-15 |
| | 14-34 | Loam, sandy clay loam, fine sandy loam | SC | A-4 | 0 | 0 | 100 | 100 | 60-80 | 35-55 | 25-40 | 5-15 |
| | 34-60 | Clay loam, silt loam | CL | A-4 | 0 | 0 | 100 | 100 | 85-95 | 50-90 | 25-40 | 5-15 |
| 879: | | | | | | | | | | | | |
| Fostoria-------- | 0-7 | Loam | CL | A-4 | 0 | 0 | 100 | 100 | 95-100 | 80-95 | 25-40 | 5-15 |
| | 7-19 | Loam | CL | A-6 | 0 | 0-5 | 100 | 100 | 75-100 | 55-95 | 30-40 | 10-20 |
| | 19-34 | Loam | CL | A-6 | 0 | 0-5 | 100 | 100 | 75-100 | 55-95 | 30-40 | 10-20 |
| | 34-80 | Loam, silt loam | CL | A-6 | 0 | 0-5 | 100 | 100 | 75-100 | 55-95 | 30-40 | 10-20 |
| 928: | | | | | | | | | | | | |
| Annieville------ | 0-8 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 8-20 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 20-52 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 52-57 | Clay loam, sandy loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 90-100 | 70-90 | 50-75 | 30-50 | 10-20 |
| | 57-80 | Clay loam, loam | CL | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 30-40 | 10-20 |
| 928B: | | | | | | | | | | | | |
| Annieville------ | 0-8 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 8-20 | Silty clay loam | ML | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 15-25 |
| | 20-52 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-50 | 15-25 |
| | 52-57 | Clay loam, sandy loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 90-100 | 70-90 | 50-75 | 30-50 | 10-20 |
| | 57-80 | Loam, clay loam | CL | A-6 | 0 | 2-5 | 95-100 | 90-100 | 75-90 | 65-80 | 30-40 | 10-20 |
| 992: | | | | | | | | | | | | |
| Gillett Grove--- | 0-8 | Silty clay loam, silty clay | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-65 | 20-35 |
| | 8-17 | Silty clay loam, silty clay | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-65 | 20-35 |
| | 17-44 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 35-50 | 20-35 |
| | 44-57 | Silt loam, silty clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 30-40 | 15-25 |
| | 57-62 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-90 | 50-75 | 30-40 | 10-20 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1053: | | | | | | | | | | | | |
| Belmann, gypsum phase---------- | 0-7 | Clay loam, loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 7-57 | Clay loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 57-80 | Silty clay, silty clay loam | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| 1091: | | | | | | | | | | | | |
| McCreath-------- | 0-6 | Silty clay loam | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-60 | 20-30 |
| | 6-17 | Silty clay loam | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-60 | 20-30 |
| | 17-35 | Silty clay loam | CL, CH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 40-55 | 20-30 |
| | 35-44 | Silt loam, silty clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 30-40 | 11-20 |
| | 44-80 | Clay loam, gravelly loam, loam | CL, CL-ML | A-6, A-4 | 0 | 0-5 | 80-100 | 75-95 | 70-95 | 55-75 | 25-40 | 5-15 |
| 1092: | | | | | | | | | | | | |
| Gillett Grove--- | 0-8 | Silty clay loam, silty clay | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-65 | 20-35 |
| | 8-17 | Silty clay loam, silty clay | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 50-65 | 20-35 |
| | 17-44 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-100 | 35-50 | 20-35 |
| | 44-57 | Silt loam, silty clay loam | CL | A-6 | 0 | 0 | 100 | 100 | 95-100 | 85-95 | 30-40 | 15-25 |
| | 57-62 | Loam, clay loam | CL | A-6 | 0 | 0-5 | 90-100 | 85-100 | 80-90 | 50-75 | 30-40 | 10-20 |
| 1133: | | | | | | | | | | | | |
| Colo------------ | 0-8 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-60 | 15-30 |
| | 8-34 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-60 | 15-30 |
| | 34-52 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 90-100 | 90-100 | 40-55 | 20-30 |
| | 52-60 | Silty clay loam | CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 80-100 | 40-55 | 15-30 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1259: | | | | | | | | | | | | |
| Biscay, depressional--- | 0-7 | Clay loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 95-100 | 70-90 | 50-75 | 35-50 | 10-25 |
| | 7-21 | Loam, clay loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 95-100 | 70-90 | 50-75 | 35-50 | 10-25 |
| | 21-37 | Loam, clay loam, sandy clay loam | CL, ML | A-6, A-7 | 0 | 0 | 95-100 | 90-100 | 70-90 | 50-75 | 30-50 | 10-20 |
| | 37-42 | Gravelly loam, sandy loam, gravelly sandy loam | SM, SC-SM, SC | A-4 | --- | 0-5 | 95-100 | 70-95 | 50-80 | 35-50 | 15-30 | 2-10 |
| | 42-60 | Stratified very gravelly coarse sand to loamy sand | SP, SP-SM, GP-GM, GP | A-1 | --- | 0-5 | 45-95 | 35-95 | 20-45 | 2-10 | --- | NP |
| 1385: | | | | | | | | | | | | |
| Ocheda---------- | 0-8 | Silty clay loam | CH, ML, CL, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-55 | 15-25 |
| | 8-20 | Silty clay loam | CH, ML, CL, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-55 | 15-25 |
| | 20-24 | Silty clay, clay, silty clay loam | CH, MH | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 50-65 | 20-35 |
| | 24-57 | Silty clay, clay, silty clay loam | CH, CL | A-7 | 0 | 0 | 100 | 100 | 95-100 | 90-95 | 40-60 | 15-30 |
| | 57-80 | Clay loam, loam | CL | A-6, A-7 | --- | 0-5 | 90-100 | 90-98 | 85-95 | 60-75 | 30-50 | 10-25 |
| 1508: | | | | | | | | | | | | |
| Belmann--------- | 0-8 | Clay loam, loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 8-16 | Clay loam, loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 16-24 | Clay loam, silty clay loam | CL | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-50 | 15-25 |
| | 24-52 | Silty clay, clay | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| | 52-80 | Silty clay | ML | A-7 | 0 | 0 | 100 | 95-100 | 95-100 | 80-95 | 40-65 | 15-30 |
| 1585: | | | | | | | | | | | | |
| Spillville------ | 0-47 | Loam | CL | A-6 | 0 | 0 | 100 | 95-100 | 85-95 | 60-80 | 25-40 | 10-20 |
| | 47-80 | Sandy clay loam, loam, sandy loam | SC-SM, SC, CL, CL-ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 80-90 | 35-75 | 20-40 | 5-15 |

Table 17.--Engineering Index Properties--Continued

| Map symbol and component name | Depth | USDA texture | Classification: Unified | Classification: AASHTO | Fragments: >10 inches | Fragments: 3-10 inches | Percentage passing sieve number--: 4 | 10 | 40 | 200 | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | | | | Pct | Pct | | | | | Pct | |
| 1585: | | | | | | | | | | | | |
| Coland---------- | 0-39 | Clay loam | CL | A-7, A-6 | 0 | 0 | 100 | 100 | 95-100 | 65-80 | 35-50 | 15-25 |
| | 39-60 | Loam, sandy loam, sandy clay loam | CL-ML, CL, SC-SM, SC | A-6, A-4 | 0 | 0 | 100 | 90-100 | 60-70 | 40-60 | 20-40 | 5-15 |
| 5010. Pits, sand and gravel | | | | | | | | | | | | |
| 5040. Udorthents, loamy | | | | | | | | | | | | |
| 5060. Pits, clay | | | | | | | | | | | | |
| AW. Animal waste | | | | | | | | | | | | |
| SL. Sewage lagoon | | | | | | | | | | | | |
| W. Water | | | | | | | | | | | | |

Table 18.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Erosion factors Kf | Erosion factors T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 6: | | | | | | | | | | | | |
| Okoboji---------------- | 0-6 | 35-40 | 1.30-1.40 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 9.0-12 | .32 | .32 | 5 | 4 | 86 |
| | 6-32 | 35-40 | 1.30-1.40 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 3.0-9.0 | .32 | .32 | | | |
| | 32-56 | 35-42 | 1.30-1.40 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 0.5-3.0 | .32 | .32 | | | |
| | 56-60 | 25-35 | 1.40-1.50 | 0.6-2 | 0.18-0.20 | 2.6-5.8 | 0.0-0.5 | .28 | .28 | | | |
| 27B: | | | | | | | | | | | | |
| Terril----------------- | 0-9 | 18-26 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 9-36 | 18-32 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 1.0-3.0 | .24 | .24 | | | |
| | 36-50 | 24-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 2.3-4.2 | 0.5-1.0 | .28 | .28 | | | |
| | 50-60 | 15-30 | 1.45-1.70 | 0.6-2 | 0.16-0.18 | 0.0-4.2 | 0.0-0.5 | .32 | .32 | | | |
| 27C: | | | | | | | | | | | | |
| Terril----------------- | 0-9 | 18-26 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 9-36 | 18-30 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 1.0-3.0 | .24 | .24 | | | |
| | 36-50 | 24-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.5-1.0 | .28 | .28 | | | |
| | 50-60 | 15-30 | 1.45-1.70 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | |
| 27D: | | | | | | | | | | | | |
| Terril----------------- | 0-9 | 18-26 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 9-36 | 18-30 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 1.0-3.0 | .24 | .24 | | | |
| | 36-50 | 24-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.5-1.0 | .28 | .28 | | | |
| | 50-60 | 15-30 | 1.45-1.70 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | |
| 31: | | | | | | | | | | | | |
| Afton------------------ | 0-7 | 33-38 | 1.25-1.30 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 6.0-7.0 | .32 | .32 | 5 | 4 | 86 |
| | 7-32 | 33-38 | 1.25-1.30 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 3.0-6.0 | .32 | .32 | | | |
| | 32-43 | 25-35 | 1.25-1.30 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 0.5-3.0 | .43 | .43 | | | |
| | 51-65 | 25-30 | 1.30-1.45 | 0.2-2 | 0.14-0.16 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| | 65-80 | 22-32 | 1.55-1.65 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| 34B: | | | | | | | | | | | | |
| Estherville------------ | 0-7 | 5-15 | 1.25-1.35 | 2-6 | 0.13-0.18 | 0.0-2.9 | 1.5-2.5 | .20 | .20 | 3 | 3 | 86 |
| | 7-18 | 10-18 | 1.35-1.60 | 2-6 | 0.12-0.19 | 0.0-2.9 | 0.5-1.0 | .20 | .20 | | | |
| | 18-80 | 0-8 | 1.50-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 41C: | | | | | | | | | | | | |
| Sparta----------------- | 0-11 | 3-10 | 1.20-1.40 | 2-6 | 0.09-0.12 | 0.0-2.9 | 1.0-2.0 | .17 | .17 | 5 | 2 | 134 |
| | 11-15 | 1-8 | 1.40-1.60 | 6-20 | 0.05-0.11 | 0.0-2.9 | 0.1-1.0 | .15 | .15 | | | |
| | 15-60 | 0-5 | 1.50-1.70 | 6-20 | 0.04-0.07 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| 48: | | | | | | | | | | | | |
| Knoke------------------ | 0-8 | 27-36 | 1.30-1.40 | 0.2-0.6 | 0.21-0.25 | 6.0-8.9 | 8.0-15 | .32 | .32 | 5 | 4L | 86 |
| | 8-15 | 27-36 | 1.30-1.40 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 5.0-8.0 | .32 | .32 | | | |
| | 15-39 | 27-36 | 1.30-1.40 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 3.0-5.0 | .37 | .37 | | | |
| | 39-80 | 27-45 | 1.35-1.45 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 0.0-3.0 | .37 | .37 | | | |
| 54: | | | | | | | | | | | | |
| Zook------------------- | 0-6 | 35-40 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 5.0-7.0 | .37 | .37 | 5 | 7 | 38 |
| | 6-20 | 35-40 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 4.0-5.0 | .37 | .37 | | | |
| | 20-60 | 36-45 | 1.30-1.45 | 0.06-0.2 | 0.11-0.13 | 6.0-8.9 | 1.0-4.0 | .28 | .28 | | | |
| 55: | | | | | | | | | | | | |
| Nicollet--------------- | 0-10 | 21-27 | 1.15-1.25 | 0.6-2 | 0.17-0.22 | 1.3-3.2 | 5.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 10-17 | 22-28 | 1.15-1.25 | 0.6-2 | 0.17-0.22 | 1.3-3.2 | 3.0-5.0 | .24 | .24 | | | |
| | 17-36 | 17-30 | 1.25-1.35 | 0.6-2 | 0.15-0.19 | 0.1-4.2 | 0.5-2.0 | .37 | .37 | | | |
| | 36-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea-bility | Available water capacity | Linear extensi-bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 62F: | | | | | | | | | | | | |
| Storden | 0-7 | 18-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.5-3.5 | .28 | .28 | 5 | 4L | 86 |
| | 7-55 | 18-30 | 1.35-1.65 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.5-1.0 | .37 | .37 | | | |
| | 55-80 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| 77B: | | | | | | | | | | | | |
| Sac | 0-6 | 31-38 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-5.0 | .28 | .28 | 5 | 7 | 38 |
| | 6-16 | 32-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 2.5-4.5 | .28 | .28 | | | |
| | 16-32 | 30-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .43 | .43 | | | |
| | 32-80 | 22-28 | 1.50-1.65 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-1.0 | .37 | .37 | | | |
| 77C: | | | | | | | | | | | | |
| Sac | 0-6 | 31-38 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-5.0 | .28 | .28 | 5 | 7 | 38 |
| | 6-16 | 32-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 2.5-4.5 | .28 | .28 | | | |
| | 16-32 | 30-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .43 | .43 | | | |
| | 32-80 | 22-28 | 1.50-1.65 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-1.0 | .37 | .37 | | | |
| 77C2: | | | | | | | | | | | | |
| Sac, moderately eroded | 0-7 | 32-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 2.5-3.5 | .28 | .28 | 5 | 7 | 38 |
| | 7-30 | 30-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 0.5-2.0 | .43 | .43 | | | |
| | 30-80 | 22-28 | 1.50-1.65 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| 90: | | | | | | | | | | | | |
| Okoboji mucky silty clay loam | 0-8 | 20-30 | 1.20-1.25 | 0.6-2 | 0.22-0.25 | 0.1-4.2 | 12-18 | .32 | .32 | 5 | 6 | 48 |
| | 8-20 | 35-42 | 1.30-1.40 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 4.0-10 | .32 | .32 | | | |
| | 20-40 | 35-42 | 1.30-1.40 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 2.0-4.0 | .32 | .32 | | | |
| | 40-60 | 25-35 | 1.40-1.50 | 0.6-2 | 0.18-0.20 | 2.6-5.8 | 1.0-2.0 | .28 | .28 | | | |
| 95: | | | | | | | | | | | | |
| Harps | 0-8 | 18-26 | 1.35-1.40 | 0.6-2 | 0.19-0.21 | 0.1-2.9 | 4.5-5.5 | .24 | .24 | 5 | 4L | 86 |
| | 8-16 | 18-32 | 1.40-1.50 | 0.6-2 | 0.17-0.19 | 0.1-4.2 | 3.0-4.0 | .32 | .32 | | | |
| | 16-42 | 18-32 | 1.40-1.50 | 0.6-2 | 0.17-0.19 | 0.1-4.2 | 1.0-2.0 | .32 | .32 | | | |
| | 42-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.1-0.5 | .37 | .37 | | | |
| 107: | | | | | | | | | | | | |
| Webster | 0-8 | 27-35 | 1.35-1.40 | 0.6-2 | 0.19-0.21 | 3.2-5.8 | 6.0-7.0 | .28 | .28 | 5 | 7 | 38 |
| | 8-16 | 27-35 | 1.35-1.40 | 0.6-2 | 0.19-0.21 | 3.2-5.8 | 4.0-5.0 | .28 | .28 | | | |
| | 16-32 | 25-35 | 1.40-1.50 | 0.6-2 | 0.16-0.18 | 2.6-5.8 | 2.0-3.0 | .32 | .32 | | | |
| | 32-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| 108: | | | | | | | | | | | | |
| Wadena | 0-7 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 4 | 6 | 48 |
| | 7-11 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 11-26 | 18-27 | 1.35-1.50 | 0.6-2 | 0.14-0.19 | 0.0-2.9 | 1.0-2.0 | .32 | .32 | | | |
| | 26-80 | 1-5 | 1.55-1.65 | >20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 108B: | | | | | | | | | | | | |
| Wadena | 0-7 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 4 | 6 | 48 |
| | 7-10 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 10-25 | 18-27 | 1.35-1.50 | 0.6-2 | 0.14-0.19 | 0.0-2.9 | 1.0-2.0 | .32 | .32 | | | |
| | 25-80 | 1-5 | 1.55-1.65 | >20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 133: | | | | | | | | | | | | |
| Colo | 0-8 | 27-36 | 1.28-1.32 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 5.0-7.0 | .28 | .28 | 5 | 7 | 38 |
| | 8-34 | 27-36 | 1.28-1.32 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 4.0-5.0 | .28 | .28 | | | |
| | 34-52 | 30-35 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 2.0-4.0 | .28 | .28 | | | |
| | 52-60 | 25-35 | 1.35-1.45 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 135: | | | | | | | | | | | | |
| Coland---------------- | 0-8 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 5.0-7.0 | .24 | .24 | 5 | 6 | 48 |
| | 8-32 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 4.0-5.0 | .24 | .24 | | | |
| | 32-40 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 2.0-4.0 | .24 | .24 | | | |
| | 40-60 | 12-26 | 1.50-1.65 | 0.6-6 | 0.13-0.17 | 0.0-2.9 | 0.0-2.0 | .28 | .28 | | | |
| 138B: | | | | | | | | | | | | |
| Clarion--------------- | 0-7 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-18 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 2.0-3.0 | .24 | .24 | | | |
| | 18-36 | 24-30 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 2.3-4.2 | 0.5-2.0 | .37 | .37 | | | |
| | 36-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| 138C2: | | | | | | | | | | | | |
| Clarion, moderately eroded--------------- | 0-7 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 2.2-3.2 | .28 | .28 | 5 | 6 | 48 |
| | 7-16 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 1.0-2.0 | .32 | .32 | | | |
| | 16-35 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 0.5-1.0 | .32 | .32 | | | |
| | 35-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.1-0.5 | .37 | .37 | | | |
| 175: | | | | | | | | | | | | |
| Dickinson------------- | 0-9 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 4 | 3 | 86 |
| | 9-18 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.5-2.5 | .20 | .20 | | | |
| | 18-30 | 10-15 | 1.45-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 0.5-1.0 | .17 | .17 | | | |
| | 30-36 | 4-10 | 1.55-1.65 | 6-20 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 36-60 | 4-10 | 1.60-1.70 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| 175B: | | | | | | | | | | | | |
| Dickinson------------- | 0-9 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.5-2.5 | .20 | .20 | 4 | 3 | 86 |
| | 9-18 | 10-15 | 1.45-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 0.5-1.0 | .17 | .17 | | | |
| | 18-30 | 10-15 | 1.45-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 0.5-1.0 | .17 | .17 | | | |
| | 30-36 | 4-10 | 1.55-1.65 | 6-20 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 36-60 | 4-10 | 1.60-1.70 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| 191: | | | | | | | | | | | | |
| Rushmore-------------- | 0-8 | 27-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 4.0-8.0 | .28 | .28 | 5 | 7 | 38 |
| | 8-18 | 27-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 4.0-8.0 | .28 | .28 | | | |
| | 18-28 | 27-35 | 1.25-1.35 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.5-1.0 | .28 | .28 | | | |
| | 28-62 | 22-32 | 1.40-1.70 | 0.2-0.6 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | |
| 201B: | | | | | | | | | | | | |
| Coland---------------- | 0-8 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 5.0-7.0 | .24 | .24 | 5 | 6 | 48 |
| | 8-32 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 4.0-5.0 | .24 | .24 | | | |
| | 32-40 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 2.0-4.0 | .24 | .24 | | | |
| | 40-60 | 12-26 | 1.50-1.65 | 0.6-6 | 0.13-0.17 | 0.0-2.9 | 0.0-2.0 | .28 | .28 | | | |
| Terril---------------- | 0-9 | 18-26 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 9-36 | 18-26 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.5-3.5 | .24 | .24 | | | |
| | 36-50 | 24-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 2.3-4.2 | 2.0-3.0 | .28 | .28 | | | |
| | 50-60 | 15-30 | 1.45-1.70 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.0-1.0 | .32 | .32 | | | |
| 202: | | | | | | | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel--------------- | 0-8 | 22-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 4.0-5.0 | .24 | .24 | 4 | 6 | 48 |
| | 8-18 | 22-30 | 1.45-1.60 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 2.0-3.0 | .32 | .32 | | | |
| | 18-28 | 22-30 | 1.45-1.60 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.5-2.0 | .32 | .32 | | | |
| | 28-80 | 2-12 | 1.60-1.70 | >20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .15 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 203: | | | | | | | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | 0-8 | 22-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 1.6-3.2 | 4.0-5.0 | .24 | .24 | 4 | 6 | 48 |
| | 8-18 | 22-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 1.6-3.2 | 2.0-3.0 | .24 | .24 | | | |
| | 18-28 | 22-30 | 1.45-1.60 | 0.6-2 | 0.17-0.19 | 1.6-3.2 | 0.5-2.0 | .32 | .32 | | | |
| | 28-80 | 2-12 | 1.60-1.70 | >20 | 0.02-0.04 | 0.0-0.0 | 0.0-0.5 | .10 | .15 | | | |
| 221: | | | | | | | | | | | | |
| Klossner | 0-10 | 0-0 | 0.25-0.45 | 0.2-6 | 0.35-0.45 | --- | 20-50 | .32 | .32 | 3 | 2 | 134 |
| | 10-26 | 0-0 | 0.25-0.45 | 0.2-6 | 0.35-0.45 | --- | 20-50 | .32 | .32 | | | |
| | 26-48 | 7-35 | 1.45-1.75 | 0.2-2 | 0.14-0.22 | 0.0-2.3 | 0.5-1.0 | .37 | .37 | | | |
| | 48-80 | 7-35 | 1.45-1.75 | 0.2-2 | 0.14-0.22 | 0.0-2.3 | 0.0-0.5 | .37 | .37 | | | |
| 259: | | | | | | | | | | | | |
| Biscay | 0-7 | 18-30 | 1.20-1.30 | 0.6-2 | 0.20-0.22 | 1.3-3.2 | 5.5-6.5 | .28 | .28 | 4 | 6 | 48 |
| | 7-20 | 18-30 | 1.20-1.30 | 0.6-2 | 0.20-0.22 | 1.3-3.2 | 4.0-5.0 | .28 | .28 | | | |
| | 20-36 | 18-30 | 1.25-1.35 | 0.6-2 | 0.17-0.19 | 1.3-3.2 | 0.5-3.0 | .28 | .28 | | | |
| | 36-80 | 1-6 | 1.55-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .05 | .10 | | | |
| 274: | | | | | | | | | | | | |
| Rolfe | 0-10 | 22-27 | 1.35-1.40 | 0.6-2 | 0.22-0.24 | 0.0-2.9 | 4.0-6.0 | .37 | .37 | 5 | 6 | 48 |
| | 10-21 | 22-27 | 1.35-1.40 | 0.6-2 | 0.22-0.24 | 0.0-2.9 | 1.0-2.0 | .37 | .37 | | | |
| | 21-55 | 38-45 | 1.40-1.50 | 0.06-0.2 | 0.11-0.13 | 6.0-8.9 | 0.5-1.0 | .28 | .28 | | | |
| | 55-80 | 24-35 | 1.50-1.60 | 0.2-2 | 0.14-0.16 | 2.3-5.9 | 0.0-0.5 | .28 | .28 | | | |
| 282: | | | | | | | | | | | | |
| Ransom | 0-8 | 27-38 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 4.0-6.0 | .32 | .32 | 5 | 7 | 38 |
| | 8-16 | 27-38 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 2.0-3.0 | .32 | .32 | | | |
| | 16-33 | 24-38 | 1.25-1.35 | 0.6-2 | 0.16-0.19 | 3.0-5.9 | 0.5-1.0 | .43 | .43 | | | |
| | 33-80 | 18-30 | 1.40-1.70 | 0.2-0.6 | 0.20-0.22 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| 308: | | | | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | 0-8 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 4 | 6 | 48 |
| | 8-13 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 13-34 | 18-27 | 1.35-1.50 | 0.6-2 | 0.14-0.19 | 1.3-3.2 | 1.0-2.0 | .32 | .32 | | | |
| | 34-60 | 1-5 | 1.55-1.65 | >20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 308B: | | | | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | 0-8 | 18-27 | 1.30-1.50 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 4 | 6 | 48 |
| | 8-13 | 18-27 | 1.35-1.50 | 0.6-2 | 0.14-0.19 | 1.3-3.2 | 2.0-3.0 | .32 | .32 | | | |
| | 13-34 | 18-27 | 1.35-1.50 | 0.6-2 | 0.14-0.19 | 1.3-3.2 | 1.0-2.0 | .32 | .32 | | | |
| | 34-60 | 1-5 | 1.55-1.65 | >20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 354. | | | | | | | | | | | | |
| Aquolls (marsh), ponded | | | | | | | | | | | | |
| 375: | | | | | | | | | | | | |
| Fostoria, lacustrine substratum | 0-7 | 27-35 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 5.0-6.0 | .24 | .24 | 5 | 4 | 86 |
| | 7-19 | 20-27 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 4.0-5.0 | .24 | .24 | | | |
| | 19-46 | 20-27 | 1.40-1.75 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 0.5-3.0 | .43 | .43 | | | |
| | 46-52 | 35-50 | 1.25-1.35 | 0-0.6 | 0.13-0.16 | 6.0-8.9 | 0.5-1.0 | .28 | .28 | | | |
| | 52-80 | 30-45 | 1.25-1.35 | 0-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea-bility | Available water capacity | Linear extensi-bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi-bility group | Wind erodi-bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 376F: | | | | | | | | | | | | |
| Cornell--------------- | 0-6 | 27-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | 5 | 6 | 48 |
| | 6-21 | 27-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 0.0-1.0 | .32 | .32 | | | |
| | 21-43 | 35-45 | 1.55-1.75 | 0.2-0.6 | 0.16-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| | 43-80 | 24-33 | 1.65-1.75 | 0.2-0.6 | 0.16-0.18 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |
| 379: | | | | | | | | | | | | |
| Ocheyedan, lacustrine substratum----------- | 0-7 | 24-29 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 4 | 86 |
| | 7-14 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 14-40 | 14-24 | 1.45-1.60 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.5-1.0 | .32 | .32 | | | |
| | 40-60 | 12-24 | 1.45-1.70 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| | 60-80 | 35-45 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | |
| 379B: | | | | | | | | | | | | |
| Ocheyedan, lacustrine substratum----------- | 0-7 | 24-29 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 4 | 86 |
| | 7-14 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 14-40 | 14-24 | 1.45-1.60 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.5-1.0 | .32 | .32 | | | |
| | 40-60 | 12-24 | 1.45-1.70 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| | 60-80 | 35-45 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | |
| 379C2: | | | | | | | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded---- | 0-8 | 24-29 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.5-3.5 | .24 | .24 | 5 | 4 | 86 |
| | 8-40 | 14-24 | 1.45-1.60 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.5-1.0 | .32 | .32 | | | |
| | 40-60 | 12-24 | 1.45-1.70 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| | 60-80 | 35-45 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | |
| 384: | | | | | | | | | | | | |
| Collinwood------------ | 0-7 | 40-55 | 1.20-1.30 | 0.2-0.6 | 0.14-0.17 | 3.0-5.9 | 5.0-7.0 | .32 | .32 | 5 | 4 | 86 |
| | 7-15 | 39-55 | 1.20-1.30 | 0.2-0.6 | 0.14-0.17 | 3.0-5.9 | 3.0-5.0 | .32 | .32 | | | |
| | 15-33 | 34-60 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 1.0-3.0 | .32 | .32 | | | |
| | 33-60 | 35-45 | 1.25-1.40 | 0-0.6 | 0.11-0.15 | 6.0-8.9 | 0.5-1.0 | .32 | .32 | | | |
| 390: | | | | | | | | | | | | |
| Waldorf--------------- | 0-9 | 35-45 | 1.20-1.30 | 0.06-0.6 | 0.18-0.25 | 6.0-8.9 | 6.0-8.0 | .28 | .28 | 5 | 4 | 86 |
| | 9-28 | 35-45 | 1.20-1.30 | 0.06-0.6 | 0.18-0.25 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | | | |
| | 28-45 | 40-55 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.5-1.0 | .32 | .32 | | | |
| | 45-80 | 24-45 | 1.25-1.45 | 0.06-0.6 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| 397: | | | | | | | | | | | | |
| Letri----------------- | 0-8 | 27-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 4.0-8.0 | .28 | .28 | 5 | 6 | 48 |
| | 8-18 | 27-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 2.0-4.0 | .28 | .28 | | | |
| | 18-32 | 18-35 | 1.25-1.35 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 1.0-2.0 | .28 | .28 | | | |
| | 32-60 | 22-32 | 1.40-1.70 | 0.2-0.6 | 0.17-0.19 | 3.0-5.9 | 0.5-1.0 | .28 | .28 | | | |
| 433E: | | | | | | | | | | | | |
| Moneta---------------- | 0-9 | 25-30 | 1.35-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 3.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 9-60 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.5-2.0 | .37 | .37 | | | |
| | 60-80 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |
| 433F: | | | | | | | | | | | | |
| Moneta---------------- | 0-9 | 25-30 | 1.35-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 3.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 9-60 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.5-2.0 | .37 | .37 | | | |
| | 60-80 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |
| 433G: | | | | | | | | | | | | |
| Moneta---------------- | 0-9 | 25-30 | 1.35-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 3.0-4.0 | .28 | .28 | 5 | 4L | 86 |
| | 9-60 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.5-2.0 | .37 | .37 | | | |
| | 60-80 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 455: | | | | | | | | | | | | |
| Wilmonton------------- | 0-8 | 27-35 | 1.25-1.35 | 0.6-2 | 0.20-0.26 | 3.0-5.9 | 4.0-7.0 | .28 | .28 | 5 | 6 | 48 |
| | 8-17 | 27-35 | 1.25-1.35 | 0.6-2 | 0.20-0.26 | 3.0-5.9 | 3.0-5.0 | .28 | .28 | | | |
| | 17-25 | 25-32 | 1.30-1.45 | 0.2-0.6 | 0.15-0.19 | 3.0-5.9 | 0.5-3.0 | .28 | .28 | | | |
| | 25-55 | 22-32 | 1.45-1.70 | 0.2-0.6 | 0.14-0.19 | 3.0-5.9 | 0.5-1.0 | .37 | .37 | | | |
| | 55-80 | 22-32 | 1.45-1.70 | 0.2-0.6 | 0.14-0.19 | 3.0-5.9 | 0.5-1.0 | .37 | .37 | | | |
| 456: | | | | | | | | | | | | |
| Wilmonton------------- | 0-8 | 27-35 | 1.25-1.35 | 0.6-2 | 0.20-0.26 | 3.0-5.9 | 4.0-7.0 | .28 | .28 | 5 | 7 | 38 |
| | 8-14 | 27-35 | 1.25-1.35 | 0.6-2 | 0.20-0.26 | 3.0-5.9 | 3.0-5.0 | .28 | .28 | | | |
| | 14-35 | 25-32 | 1.30-1.45 | 0.2-0.6 | 0.15-0.19 | 3.0-5.9 | 0.5-3.0 | .28 | .28 | | | |
| | 35-80 | 22-32 | 1.45-1.70 | 0.2-0.6 | 0.14-0.19 | 3.0-5.9 | 0.5-1.0 | .37 | .37 | | | |
| 485: | | | | | | | | | | | | |
| Spillville------------ | 0-20 | 18-26 | 1.45-1.55 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 4.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 20-54 | 18-26 | 1.45-1.55 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 1.0-4.0 | .24 | .24 | | | |
| | 54-80 | 14-24 | 1.55-1.70 | 0.6-6 | 0.15-0.18 | 0.0-2.3 | 0.5-2.0 | .28 | .28 | | | |
| 506: | | | | | | | | | | | | |
| Wacousta-------------- | 0-9 | 27-35 | 1.20-1.25 | 0.6-2 | 0.21-0.23 | 3.2-5.8 | 8.0-10 | .28 | .28 | 5 | 7 | 38 |
| | 9-14 | 27-35 | 1.20-1.25 | 0.6-2 | 0.21-0.23 | 3.2-5.8 | 7.0-9.0 | .28 | .28 | | | |
| | 14-16 | 24-35 | 1.25-1.30 | 0.6-2 | 0.18-0.20 | 2.3-5.8 | 2.0-4.0 | .28 | .28 | | | |
| | 16-60 | 18-30 | 1.30-1.40 | 0.6-2 | 0.20-0.22 | 0.4-4.2 | 0.0-1.0 | .43 | .43 | | | |
| 507: | | | | | | | | | | | | |
| Canisteo-------------- | 0-10 | 27-35 | 1.25-1.35 | 0.6-2 | 0.18-0.22 | 3.2-5.8 | 5.0-7.0 | .24 | .24 | 5 | 4L | 86 |
| | 10-18 | 27-35 | 1.25-1.35 | 0.6-2 | 0.18-0.22 | 3.2-5.8 | 3.0-5.0 | .24 | .24 | | | |
| | 18-39 | 20-35 | 1.35-1.50 | 0.6-2 | 0.15-0.19 | 3.0-5.8 | 2.0-4.0 | .32 | .32 | | | |
| | 39-80 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.1-0.5 | .37 | .37 | | | |
| 541C: | | | | | | | | | | | | |
| Estherville----------- | 0-7 | 5-15 | 1.25-1.35 | 2-6 | 0.13-0.18 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | 3 | 3 | 86 |
| | 7-18 | 10-18 | 1.35-1.60 | 2-6 | 0.12-0.19 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 18-80 | 0-8 | 1.50-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| Hawick---------------- | 0-7 | 5-15 | 1.35-1.55 | 2-6 | 0.13-0.15 | 0.0-2.9 | 1.0-4.0 | .17 | .17 | 3 | 3 | 86 |
| | 7-11 | 1-10 | 1.50-1.65 | 6-20 | 0.03-0.10 | 0.0-2.9 | 0.0-0.5 | .10 | .15 | | | |
| | 11-73 | 1-5 | 1.55-1.65 | >20 | 0.02-0.06 | 0.0-2.9 | 0.0-0.5 | .10 | .15 | | | |
| 559: | | | | | | | | | | | | |
| Talcot---------------- | 0-10 | 30-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 5.0-7.0 | .28 | .28 | 4 | 4L | 86 |
| | 10-26 | 30-35 | 1.20-1.30 | 0.6-2 | 0.18-0.22 | 3.0-5.9 | 2.0-4.0 | .28 | .28 | | | |
| | 26-30 | 30-35 | 1.25-1.35 | 0.6-2 | 0.17-0.20 | 3.0-5.9 | 1.0-2.0 | .28 | .28 | | | |
| | 30-60 | 1-6 | 1.55-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.5-1.0 | .15 | .15 | | | |
| 577B: | | | | | | | | | | | | |
| Everly---------------- | 0-8 | 27-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 8-12 | 27-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 2.0-4.0 | .24 | .24 | | | |
| | 12-26 | 25-35 | 1.45-1.55 | 0.6-2 | 0.15-0.17 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |
| | 26-80 | 22-32 | 1.55-1.65 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| 577C2: | | | | | | | | | | | | |
| Everly, moderately eroded--------------- | 0-7 | 27-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 2.0-3.0 | .28 | .28 | 5 | 6 | 48 |
| | 7-26 | 25-35 | 1.45-1.55 | 0.6-2 | 0.15-0.17 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |
| | 26-80 | 22-32 | 1.55-1.65 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| 637D2: | | | | | | | | | | | | |
| Everly, moderately eroded--------------- | 0-7 | 27-30 | 1.40-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 2.0-3.0 | .28 | .28 | 5 | 6 | 48 |
| | 7-26 | 25-35 | 1.45-1.55 | 0.6-2 | 0.15-0.17 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |
| | 26-80 | 22-32 | 1.55-1.65 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 637D2: | | | | | | | | | | | | |
| Moneta, moderately eroded--------------- | 0-7 | 25-30 | 1.35-1.45 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 3.0-4.0 | .28 | .28 | 5 | 6 | 48 |
| | 7-57 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.5-2.0 | .37 | .37 | | | |
| | 57-80 | 25-33 | 1.35-1.65 | 0.6-2 | 0.15-0.19 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |
| 638C2: | | | | | | | | | | | | |
| Clarion, moderately eroded--------------- | 0-7 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 2.0-3.0 | .28 | .28 | 5 | 6 | 48 |
| | 7-16 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 1.0-2.0 | .32 | .32 | | | |
| | 16-35 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 0.5-1.0 | .32 | .32 | | | |
| | 35-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.1-0.5 | .37 | .37 | | | |
| Storden, moderately eroded--------------- | 0-7 | 18-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 0.1-3.2 | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 7-11 | 18-30 | 1.35-1.65 | 0.6-2 | 0.17-0.19 | 1.3-4.2 | 0.0-0.5 | .37 | .37 | | | |
| | 11-80 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| 672: | | | | | | | | | | | | |
| May City-------------- | 0-7 | 7-35 | 1.35-1.55 | 2-6 | 0.11-0.15 | 0.0-2.9 | 2.0-4.0 | .20 | .20 | 2 | 3 | 86 |
| | 7-19 | 7-35 | 1.55-1.65 | 2-6 | 0.10-0.19 | 0.0-2.9 | 0.5-1.0 | .24 | .24 | | | |
| | 19-80 | 5-30 | 1.50-1.80 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 672B: | | | | | | | | | | | | |
| May City-------------- | 0-7 | 7-35 | 1.35-1.55 | 2-6 | 0.11-0.15 | 0.0-2.9 | 2.0-4.0 | .20 | .20 | 2 | 3 | 86 |
| | 7-19 | 7-35 | 1.55-1.65 | 2-6 | 0.10-0.19 | 0.0-2.9 | 0.5-1.0 | .24 | .24 | | | |
| | 19-80 | 5-30 | 1.50-1.80 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 672C2: | | | | | | | | | | | | |
| May City, moderately eroded--------------- | 0-7 | 7-35 | 1.35-1.55 | 2-6 | 0.11-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 2 | 3 | 86 |
| | 7-17 | 7-35 | 1.55-1.65 | 2-6 | 0.10-0.19 | 0.0-2.9 | 0.0-1.0 | .24 | .24 | | | |
| | 17-80 | 5-30 | 1.50-1.80 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| 709: | | | | | | | | | | | | |
| Fairhaven------------- | 0-9 | 18-27 | 1.25-1.40 | 0.6-2 | 0.22-0.24 | 0.0-2.9 | 3.0-5.0 | .32 | .32 | 4 | 6 | 48 |
| | 9-25 | 18-27 | 1.25-1.40 | 0.6-2 | 0.22-0.24 | 0.0-2.9 | 1.0-4.0 | .32 | .32 | | | |
| | 25-30 | 18-30 | 1.30-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 0.5-1.0 | .43 | .43 | | | |
| | 30-80 | 0-5 | 1.55-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-1.0 | .10 | .17 | | | |
| 733: | | | | | | | | | | | | |
| Calco----------------- | 0-9 | 28-33 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 5.0-7.0 | .28 | .28 | 5 | 4L | 86 |
| | 9-27 | 28-33 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 4.0-5.0 | .28 | .28 | | | |
| | 27-36 | 30-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 2.0-4.0 | .28 | .28 | | | |
| | 36-80 | 22-32 | 1.30-1.45 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |
| 735: | | | | | | | | | | | | |
| Havelock-------------- | 0-9 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 6.0-8.9 | 5.0-7.0 | .24 | .24 | 5 | 4L | 86 |
| | 9-40 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 6.0-8.9 | 1.0-4.0 | .28 | .28 | | | |
| | 40-73 | 12-26 | 1.50-1.65 | 2-6 | 0.13-0.17 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | |
| 740D: | | | | | | | | | | | | |
| Hawick---------------- | 0-7 | 5-15 | 1.35-1.55 | 2-6 | 0.13-0.15 | 0.0-2.9 | 1.0-4.0 | .17 | .17 | 3 | 3 | 86 |
| | 7-11 | 1-10 | 1.50-1.65 | 6-20 | 0.03-0.10 | 0.0-2.9 | 0.0-0.5 | .10 | .15 | | | |
| | 11-73 | 1-5 | 1.55-1.65 | >20 | 0.02-0.06 | 0.0-2.9 | 0.0-0.5 | .10 | .15 | | | |
| 810: | | | | | | | | | | | | |
| Galva, terrace-------- | 0-6 | 34-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 4.0-5.0 | .32 | .32 | 5 | 4 | 86 |
| | 6-17 | 34-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | | | |
| | 17-31 | 30-39 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .43 | .43 | | | |
| | 31-45 | 25-30 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.5-1.0 | .43 | .43 | | | |
| | 45-60 | 22-27 | 1.60-1.80 | 0.6-2 | 0.16-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 810B: | | | | | | | | | | | | |
| Galva, terrace-------- | 0-6 | 34-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | 5 | 4 | 86 |
| | 6-17 | 34-39 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | | | |
| | 17-31 | 30-39 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .43 | .43 | | | |
| | 31-45 | 25-30 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| | 45-60 | 22-27 | 1.60-1.80 | 0.6-2 | 0.16-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 828B: | | | | | | | | | | | | |
| Zenor----------------- | 0-8 | 10-15 | 1.50-1.55 | 2-6 | 0.10-0.12 | 0.0-2.9 | 1.5-2.5 | .20 | .20 | 4 | 3 | 86 |
| | 8-33 | 14-18 | 1.55-1.60 | 2-6 | 0.09-0.11 | 0.0-2.9 | 0.0-1.0 | .20 | .20 | | | |
| | 33-60 | 2-8 | 1.60-1.75 | >20 | 0.01-0.03 | 0.0-2.9 | 0.0-1.0 | .10 | .15 | | | |
| 828C2: | | | | | | | | | | | | |
| Zenor, moderately eroded--------------- | 0-8 | 10-15 | 1.50-1.55 | 2-6 | 0.10-0.12 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | 4 | 3 | 86 |
| | 8-30 | 14-18 | 1.55-1.60 | 2-6 | 0.09-0.11 | 0.0-2.9 | 0.0-1.0 | .20 | .20 | | | |
| | 30-60 | 2-8 | 1.60-1.75 | >20 | 0.01-0.03 | 0.0-2.9 | 0.0-1.0 | .10 | .15 | | | |
| 835D2: | | | | | | | | | | | | |
| Storden, moderately eroded--------------- | 0-7 | 18-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 0.4-2.9 | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 7-11 | 18-30 | 1.35-1.65 | 0.6-2 | 0.17-0.19 | 0.4-4.2 | 0.0-0.5 | .37 | .37 | | | |
| | 11-80 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| Omsrud, moderately eroded--------------- | 0-7 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 2.0-3.0 | .28 | .28 | 5 | 4L | 48 |
| | 7-24 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.3 | 1.0-2.0 | .32 | .32 | | | |
| | 24-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-1.6 | 0.0-0.5 | .37 | .37 | | | |
| 835E2: | | | | | | | | | | | | |
| Storden, moderately eroded--------------- | 0-7 | 18-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 1.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 7-11 | 18-22 | 1.55-1.75 | 0.6-2 | 0.15-0.19 | 0.0-2.9 | 0.0-1.0 | .32 | .32 | | | |
| | 11-80 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| Omsrud, moderately eroded--------------- | 0-7 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .28 | .28 | 5 | 4L | 86 |
| | 7-24 | 18-24 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 1.0-2.0 | .32 | .32 | | | |
| | 24-60 | 12-22 | 1.50-1.70 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| 854D: | | | | | | | | | | | | |
| Histosols, fens------- | --- | --- | --- | 0.6-6 | --- | --- | --- | --- | --- | - | --- | --- |
| 874: | | | | | | | | | | | | |
| Dickinson, lacustrine substratum----------- | 0-9 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 5 | 4 | 86 |
| | 9-30 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.5 | .20 | .20 | | | |
| | 30-36 | 4-10 | 1.55-1.65 | 6-20 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 36-67 | 4-10 | 1.60-1.70 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 67-80 | 25-45 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 874B: | | | | | | | | | | | | |
| Dickinson, lacustrine substratum----------- | 0-9 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 5 | 4 | 86 |
| | 9-30 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.5 | .20 | .20 | | | |
| | 30-36 | 4-10 | 1.55-1.65 | 6-20 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 36-67 | 4-10 | 1.60-1.70 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 67-80 | 25-45 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 874C2: | | | | | | | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded---- | 0-8 | 10-18 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | 5 | 4 | 86 |
| | 8-30 | 10-15 | 1.45-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 0.5-1.0 | .17 | .17 | | | |
| | 30-36 | 4-10 | 1.55-1.65 | 6-20 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 36-67 | 4-10 | 1.60-1.70 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 67-80 | 25-45 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 875: | | | | | | | | | | | | |
| Roine----------------- | 0-8 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 4 | 3 | 86 |
| | 8-48 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | | | |
| | 48-52 | 10-27 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| | 52-59 | 10-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| | 59-80 | 25-33 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| 875B: | | | | | | | | | | | | |
| Roine----------------- | 0-8 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 4 | 3 | 86 |
| | 8-48 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | | | |
| | 48-52 | 10-27 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| | 52-59 | 10-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| | 59-80 | 25-33 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| 875C2: | | | | | | | | | | | | |
| Roine, moderately eroded--------------- | 0-8 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 2.0-3.0 | .20 | .20 | 4 | 3 | 86 |
| | 8-45 | 10-25 | 1.50-1.55 | 2-6 | 0.12-0.15 | 0.0-2.9 | 1.0-2.0 | .20 | .20 | | | |
| | 45-52 | 10-27 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| | 52-59 | 10-27 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| | 59-80 | 25-33 | 1.55-1.75 | 0.6-2 | 0.17-0.19 | 0.0-2.9 | 0.0-0.5 | .37 | .37 | | | |
| 878: | | | | | | | | | | | | |
| Ocheyedan------------- | 0-7 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-14 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 14-34 | 14-24 | 1.45-1.60 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.5-1.0 | .32 | .32 | | | |
| | 34-60 | 12-28 | 1.45-1.70 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| 878B: | | | | | | | | | | | | |
| Ocheyedan------------- | 0-7 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-4.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-14 | 24-27 | 1.40-1.45 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | | | |
| | 14-34 | 14-24 | 1.45-1.60 | 0.6-2 | 0.16-0.18 | 0.0-2.9 | 0.5-1.0 | .32 | .32 | | | |
| | 34-60 | 12-28 | 1.45-1.70 | 0.6-2 | 0.19-0.21 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| 879: | | | | | | | | | | | | |
| Fostoria-------------- | 0-7 | 25-27 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 5.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 7-19 | 25-30 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 3.0-5.0 | .24 | .24 | | | |
| | 19-34 | 16-26 | 1.40-1.75 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 0.5-2.0 | .43 | .43 | | | |
| | 34-80 | 16-26 | 1.40-1.75 | 0.6-2 | 0.20-0.22 | 0.0-2.9 | 0.5-1.0 | .43 | .43 | | | |
| 928: | | | | | | | | | | | | |
| Annieville------------ | 0-8 | 27-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-5.0 | .32 | .32 | 5 | 4 | 86 |
| | 8-20 | 25-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | | | |
| | 20-52 | 25-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 0.5-2.0 | .43 | .43 | | | |
| | 52-57 | 18-33 | 1.25-1.35 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | |
| | 57-80 | 25-33 | 1.60-1.80 | 0.6-2 | 0.16-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 928B: | | | | | | | | | | | | |
| Annieville------------ | 0-8 | 27-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 3.0-4.0 | .32 | .32 | 5 | 4 | 86 |
| | 8-20 | 25-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 2.0-4.0 | .32 | .32 | | | |
| | 20-52 | 25-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 0.5-2.0 | .43 | .43 | | | |
| | 52-57 | 18-33 | 1.25-1.35 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | |
| | 57-80 | 25-33 | 1.60-1.80 | 0.6-2 | 0.16-0.22 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 992: | | | | | | | | | | | | |
| Gillett Grove | 0-8 | 36-42 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 6.0-8.0 | .28 | .28 | 4 | 4 | 86 |
| | 8-17 | 36-42 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | | | |
| | 17-44 | 30-35 | 1.35-1.40 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 1.0-3.0 | .43 | .43 | | | |
| | 44-57 | 24-35 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-1.0 | .43 | .43 | | | |
| | 57-62 | 24-32 | 1.60-1.75 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 1053: | | | | | | | | | | | | |
| Belmann, gypsum phase | 0-7 | 25-38 | 1.20-1.30 | 0.2-0.6 | 0.16-0.19 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | 5 | 4 | 86 |
| | 7-57 | 35-40 | 1.20-1.30 | 0.2-0.6 | 0.16-0.19 | 6.0-8.9 | 1.0-4.0 | .28 | .28 | | | |
| | 57-80 | 27-45 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | |
| 1091: | | | | | | | | | | | | |
| McCreath | 0-6 | 28-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 6.0-8.9 | 5.0-6.0 | .28 | .28 | 5 | 4 | 86 |
| | 6-17 | 28-35 | 1.25-1.30 | 0.6-2 | 0.21-0.23 | 6.0-8.9 | 4.0-5.0 | .28 | .28 | | | |
| | 17-35 | 30-35 | 1.30-1.35 | 0.6-2 | 0.18-0.20 | 6.0-8.9 | 0.5-2.0 | .43 | .43 | | | |
| | 35-44 | 25-30 | 1.35-1.40 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-1.0 | .43 | .43 | | | |
| | 44-80 | 22-30 | 1.60-1.80 | 0.6-2 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .43 | .43 | | | |
| 1092: | | | | | | | | | | | | |
| Gillett Grove | 0-8 | 36-42 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 6.0-8.0 | .28 | .28 | 5 | 4 | 86 |
| | 8-17 | 36-42 | 1.30-1.35 | 0.2-0.6 | 0.21-0.23 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | | | |
| | 17-44 | 30-35 | 1.35-1.40 | 0.2-0.6 | 0.18-0.20 | 6.0-8.9 | 1.0-3.0 | .43 | .43 | | | |
| | 44-57 | 24-35 | 1.35-1.45 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 0.0-1.0 | .43 | .43 | | | |
| | 57-62 | 24-32 | 1.60-1.75 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.0-0.5 | .43 | .43 | | | |
| 1133: | | | | | | | | | | | | |
| Colo | 0-8 | 27-36 | 1.28-1.32 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 5.0-7.0 | .28 | .28 | 5 | 7 | 38 |
| | 8-34 | 27-36 | 1.28-1.32 | 0.6-2 | 0.21-0.23 | 3.0-5.9 | 4.0-6.0 | .28 | .28 | | | |
| | 34-52 | 30-35 | 1.25-1.35 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 2.0-4.0 | .28 | .28 | | | |
| | 52-60 | 25-35 | 1.35-1.45 | 0.6-2 | 0.18-0.20 | 3.0-5.9 | 1.0-2.0 | .32 | .32 | | | |
| 1259: | | | | | | | | | | | | |
| Biscay, depressional | 0-7 | 27-30 | 1.20-1.30 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 6.0-10 | .28 | .28 | 4 | 6 | 48 |
| | 7-21 | 25-30 | 1.20-1.30 | 0.6-2 | 0.20-0.22 | 3.0-5.9 | 1.0-6.0 | .28 | .28 | | | |
| | 21-37 | 18-30 | 1.25-1.35 | 0.6-2 | 0.17-0.19 | 3.0-5.9 | 0.5-1.0 | .28 | .28 | | | |
| | 37-42 | 10-28 | 1.35-1.55 | 2-6 | 0.11-0.17 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | |
| | 42-60 | 1-6 | 1.55-1.65 | 6-20 | 0.02-0.04 | 0.0-2.9 | 0.0-0.5 | .05 | .10 | | | |
| 1385: | | | | | | | | | | | | |
| Ocheda | 0-8 | 35-40 | 1.20-1.30 | 0.2-0.6 | 0.14-0.17 | 3.0-5.9 | 5.0-6.0 | .32 | .32 | 5 | 4 | 86 |
| | 8-20 | 35-40 | 1.20-1.30 | 0.2-0.6 | 0.14-0.17 | 3.0-5.9 | 2.0-4.0 | .32 | .32 | | | |
| | 20-24 | 35-60 | 1.25-1.35 | 0-0.6 | 0.13-0.16 | 6.0-8.9 | 1.0-2.0 | .32 | .32 | | | |
| | 24-57 | 35-45 | 1.25-1.40 | 0-0.6 | 0.11-0.15 | 6.0-8.9 | 0.0-1.0 | .32 | .32 | | | |
| | 57-80 | 24-40 | 1.35-1.80 | 0-0.6 | 0.15-0.17 | 3.0-5.9 | 0.0-0.5 | .37 | .37 | | | |
| 1508: | | | | | | | | | | | | |
| Belmann | 0-8 | 25-38 | 1.20-1.30 | 0.2-0.6 | 0.16-0.19 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | 5 | 4 | 86 |
| | 8-16 | 25-38 | 1.20-1.30 | 0.2-0.6 | 0.16-0.19 | 6.0-8.9 | 4.0-6.0 | .28 | .28 | | | |
| | 16-24 | 27-38 | 1.20-1.30 | 0.2-0.6 | 0.16-0.19 | 6.0-8.9 | 2.0-4.0 | .28 | .28 | | | |
| | 24-52 | 35-60 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.5-3.0 | .28 | .28 | | | |
| | 52-80 | 27-45 | 1.25-1.35 | 0.06-0.6 | 0.13-0.16 | 6.0-8.9 | 0.0-1.0 | .28 | .28 | | | |
| 1585: | | | | | | | | | | | | |
| Spillville | 0-47 | 18-26 | 1.45-1.55 | 0.6-2 | 0.19-0.21 | 0.4-2.9 | 2.0-6.0 | .24 | .24 | 5 | 6 | 48 |
| | 47-80 | 14-24 | 1.55-1.70 | 0.6-6 | 0.15-0.18 | 0.0-2.3 | 0.0-2.0 | .28 | .28 | | | |
| Coland | 0-39 | 27-35 | 1.40-1.50 | 0.6-2 | 0.20-0.22 | 3.2-5.8 | 2.0-7.0 | .24 | .24 | 5 | 6 | 48 |
| | 39-60 | 12-26 | 1.50-1.65 | 0.6-6 | 0.13-0.17 | 0.0-2.9 | 0.0-2.0 | .28 | .28 | | | |
| 5010. | | | | | | | | | | | | |
| Pits, sand and gravel | | | | | | | | | | | | |

Table 18.--Physical Properties of the Soils--Continued

| Map symbol and component name | Depth | Clay | Moist bulk density | Permea- bility | Available water capacity | Linear extensi- bility | Organic matter | Erosion factors Kw | Kf | T | Wind erodi- bility group | Wind erodi- bility index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | |
| 5040. Udorthents, loamy | | | | | | | | | | | | |
| 5060. Pits, clay | | | | | | | | | | | | |
| AW. Animal waste | | | | | | | | | | | | |
| SL. Sewage lagoon | | | | | | | | | | | | |
| W. Water | | | | | | | | | | | | |

Table 19.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 6: | | | | | |
| Okoboji | 0-6 | 41-41 | 6.6-7.8 | 0-15 | --- |
| | 6-32 | 41-41 | 6.6-7.8 | 0-15 | --- |
| | 32-56 | 41-45 | 6.6-7.8 | 0-15 | --- |
| | 56-60 | 30-36 | 7.6-8.4 | 5-30 | --- |
| 27B: | | | | | |
| Terril | 0-9 | 20-25 | 6.1-7.3 | 0 | --- |
| | 9-36 | 20-25 | 6.1-7.3 | 0 | --- |
| | 36-50 | 20-25 | 6.1-7.3 | 0 | --- |
| | 50-60 | 15-25 | 6.1-7.8 | 0-15 | --- |
| 27C: | | | | | |
| Terril | 0-9 | 20-25 | 6.1-7.3 | 0 | --- |
| | 9-36 | 20-25 | 6.1-7.3 | 0 | --- |
| | 36-50 | 20-25 | 6.1-7.3 | 0 | --- |
| | 50-60 | 15-25 | 6.1-7.8 | 0-15 | --- |
| 27D: | | | | | |
| Terril | 0-9 | 20-25 | 6.1-7.3 | 0 | --- |
| | 9-36 | 20-25 | 6.1-7.3 | 0 | --- |
| | 36-50 | 20-25 | 6.1-7.3 | 0 | --- |
| | 50-60 | 15-25 | 6.1-7.8 | 0-15 | --- |
| 31: | | | | | |
| Afton | 0-7 | 30-36 | 6.1-7.8 | 0-10 | --- |
| | 7-32 | 30-36 | 6.1-7.8 | 0-10 | --- |
| | 32-43 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 51-65 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 65-80 | 25-30 | 7.6-8.4 | 5-30 | --- |
| 34B: | | | | | |
| Estherville | 0-7 | 15-20 | 5.6-7.3 | 0 | --- |
| | 7-18 | 5.0-20 | 5.6-7.3 | 0 | --- |
| | 18-80 | 0.0-10 | 6.6-8.4 | 0-20 | --- |
| 41C: | | | | | |
| Sparta | 0-11 | 2.0-12 | 5.6-7.3 | 0 | --- |
| | 11-15 | 1.0-6.0 | 5.1-7.3 | 0 | --- |
| | 15-60 | 1.0-4.0 | 5.1-7.8 | 0 | --- |
| 48: | | | | | |
| Knoke | 0-8 | 41-41 | 7.6-8.4 | 5-30 | --- |
| | 8-15 | 41-41 | 7.6-8.4 | 5-30 | --- |
| | 15-39 | 36-41 | 7.6-8.4 | 5-30 | --- |
| | 39-80 | 36-41 | 7.6-8.4 | 5-30 | --- |
| 54: | | | | | |
| Zook | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-20 | 36-41 | 5.6-7.3 | 0 | --- |
| | 20-60 | 36-41 | 5.6-7.8 | 0 | --- |
| 55: | | | | | |
| Nicollet | 0-10 | 20-25 | 6.1-7.3 | 0 | --- |
| | 10-17 | 20-25 | 6.1-7.3 | 0 | --- |
| | 17-36 | 15-25 | 5.6-7.8 | 0-15 | --- |
| | 36-60 | 20-25 | 7.6-8.4 | 5-30 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 62F: | | | | | |
| Storden | 0-7 | 15-20 | 7.6-8.4 | 5-30 | --- |
| | 7-55 | 15-20 | 7.6-8.4 | 5-30 | --- |
| | 55-80 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 77B: | | | | | |
| Sac | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-16 | 36-41 | 5.6-7.3 | 0 | --- |
| | 16-32 | 36-41 | 5.6-7.3 | 0 | --- |
| | 32-80 | 30-36 | 6.6-8.4 | 0-30 | --- |
| 77C: | | | | | |
| Sac | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-16 | 36-41 | 5.6-7.3 | 0 | --- |
| | 16-32 | 36-41 | 5.6-7.3 | 0 | --- |
| | 32-80 | 30-36 | 6.6-8.4 | 0-30 | --- |
| 77C2: | | | | | |
| Sac, moderately eroded | 0-7 | 36-41 | 5.6-7.3 | --- | --- |
| | 7-30 | 36-41 | 5.6-7.3 | --- | --- |
| | 30-80 | 30-36 | 6.6-8.4 | 0-30 | --- |
| 90: | | | | | |
| Okoboji mucky silty clay loam | 0-8 | 41-41 | 6.1-7.8 | 0-15 | --- |
| | 8-20 | 41-45 | 6.6-7.8 | 0-15 | --- |
| | 20-40 | 41-45 | 6.6-7.8 | 0-15 | --- |
| | 40-60 | 30-36 | 7.6-8.4 | 5-30 | --- |
| 95: | | | | | |
| Harps | 0-8 | 36-41 | 7.9-8.4 | 20-30 | --- |
| | 8-16 | 25-30 | 7.9-8.4 | 20-30 | --- |
| | 16-42 | 25-30 | 7.9-8.4 | 20-30 | --- |
| | 42-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 107: | | | | | |
| Webster | 0-8 | 36-41 | 6.6-7.3 | 0 | --- |
| | 8-16 | 36-41 | 6.6-7.3 | 0 | --- |
| | 16-32 | 35-41 | 6.6-7.8 | 5-10 | --- |
| | 32-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 108: | | | | | |
| Wadena | 0-7 | 5.0-25 | 6.1-7.3 | 0 | --- |
| | 7-11 | 5.0-25 | 6.1-7.3 | 0 | --- |
| | 11-26 | 5.0-20 | 5.6-7.3 | 0 | --- |
| | 26-80 | 0.0-5.0 | 6.6-8.4 | 0-15 | --- |
| 108B: | | | | | |
| Wadena | 0-7 | 5.0-25 | 6.1-7.3 | 0 | --- |
| | 7-10 | 5.0-25 | 6.1-7.3 | 0 | --- |
| | 10-25 | 5.0-20 | 5.6-7.3 | 0 | --- |
| | 25-80 | 0.0-5.0 | 6.6-8.4 | 0-15 | --- |
| 133: | | | | | |
| Colo | 0-8 | 36-41 | 5.6-7.3 | 0 | --- |
| | 8-34 | 36-41 | 5.6-7.3 | 0 | --- |
| | 34-52 | 36-41 | 5.6-7.3 | 0 | --- |
| | 52-60 | 30-36 | 6.1-7.3 | 0 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 135: | | | | | |
| Coland--------------- | 0-8 | 30-36 | 6.1-7.3 | 0 | --- |
| | 8-32 | 30-36 | 6.1-7.3 | 0 | --- |
| | 32-40 | 30-36 | 6.1-7.3 | 0 | --- |
| | 40-60 | 20-30 | 6.1-7.8 | 0-20 | --- |
| 138B: | | | | | |
| Clarion-------------- | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-18 | 20-25 | 5.6-7.3 | 0 | --- |
| | 18-36 | 20-25 | 5.6-7.8 | 0-15 | --- |
| | 36-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 138C2: | | | | | |
| Clarion, moderately eroded-------------- | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-16 | 20-25 | 5.6-7.3 | 0 | --- |
| | 16-35 | 20-25 | 5.6-7.8 | 0-15 | --- |
| | 35-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 175: | | | | | |
| Dickinson------------ | 0-9 | 15-20 | 5.6-7.3 | 0 | --- |
| | 9-18 | 15-20 | 5.6-7.3 | 0 | --- |
| | 18-30 | 15-20 | 5.1-6.5 | 0 | --- |
| | 30-36 | 5.0-10 | 5.1-6.5 | 0 | --- |
| | 36-60 | 5.0-10 | 5.6-7.3 | 0 | --- |
| 175B: | | | | | |
| Dickinson------------ | 0-9 | 15-20 | 5.6-7.3 | 0 | --- |
| | 9-18 | 15-20 | 5.1-6.5 | 0 | --- |
| | 18-30 | 15-20 | 5.1-6.5 | 0 | --- |
| | 30-36 | 5.0-10 | 5.1-6.5 | 0 | --- |
| | 36-60 | 5.0-10 | 5.6-7.3 | 0 | --- |
| 191: | | | | | |
| Rushmore------------- | 0-8 | 36-41 | 6.1-7.8 | 0 | --- |
| | 8-18 | 36-41 | 6.1-7.8 | 0 | --- |
| | 18-28 | 36-41 | 6.1-7.8 | 0-30 | --- |
| | 28-62 | 30-36 | 6.6-8.4 | 0-30 | --- |
| 201B: | | | | | |
| Coland--------------- | 0-8 | 30-36 | 6.1-7.3 | 0 | --- |
| | 8-32 | 30-36 | 6.1-7.3 | 0 | --- |
| | 32-40 | 30-36 | 6.1-7.3 | 0 | --- |
| | 40-60 | 20-30 | 6.1-7.8 | 0-20 | --- |
| Terril--------------- | 0-9 | 20-25 | 6.1-7.3 | 0 | --- |
| | 9-36 | 20-25 | 6.1-7.3 | 0 | --- |
| | 36-50 | 20-25 | 6.1-7.3 | 0 | --- |
| | 50-60 | 15-25 | 6.1-7.8 | 0-15 | --- |
| 202: | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel------------- | 0-8 | 20-25 | 5.6-7.3 | 0 | --- |
| | 8-18 | 20-25 | 6.1-7.3 | 0 | --- |
| | 18-28 | 20-25 | 6.1-7.3 | 0 | --- |
| | 28-80 | 5.0-10 | 6.6-8.4 | 0-25 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 203: | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | 0-8 | 20-25 | 5.6-7.3 | 0 | --- |
| | 8-18 | 20-25 | 5.6-7.3 | 0 | --- |
| | 18-28 | 20-25 | 6.1-7.3 | 0 | --- |
| | 28-80 | 5.0-10 | 6.6-8.4 | 0-25 | --- |
| 221: | | | | | |
| Klossner | 0-10 | 65-65 | 5.1-7.4 | 0 | --- |
| | 10-26 | 65-65 | 5.1-7.4 | 0 | --- |
| | 26-48 | 2.0-15 | 6.1-8.4 | 0-30 | --- |
| | 48-80 | 2.0-15 | 6.1-8.4 | 0-30 | --- |
| 259: | | | | | |
| Biscay | 0-7 | 30-36 | 6.1-7.4 | 0-15 | --- |
| | 7-20 | 30-36 | 6.1-7.4 | 0-15 | --- |
| | 20-36 | 12-25 | 6.6-7.8 | 0-15 | --- |
| | 36-80 | 1.0-5.0 | 7.6-8.4 | 5-30 | --- |
| 274: | | | | | |
| Rolfe | 0-10 | 20-25 | 5.1-7.3 | 0 | --- |
| | 10-21 | 20-25 | 5.1-7.3 | 0 | --- |
| | 21-55 | 20-30 | 6.1-7.3 | 0 | --- |
| | 55-80 | 20-25 | 6.1-8.4 | 0-25 | --- |
| 282: | | | | | |
| Ransom | 0-8 | 36-41 | 6.6-7.3 | 0 | --- |
| | 8-16 | 36-41 | 6.6-7.3 | 0 | --- |
| | 16-33 | 36-41 | 6.6-7.8 | 0 | --- |
| | 33-80 | 30-36 | 7.4-8.4 | 0-30 | --- |
| 308: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | 0-8 | 20-25 | 6.1-7.3 | 0 | --- |
| | 8-13 | 20-25 | 6.1-7.3 | 0 | --- |
| | 13-34 | 20-25 | 5.6-7.3 | 0 | --- |
| | 34-60 | 0.0-5.0 | 6.6-8.4 | 0-15 | --- |
| 308B: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | 0-8 | 20-25 | 6.1-7.3 | 0 | --- |
| | 8-13 | 20-25 | 5.6-7.3 | 0 | --- |
| | 13-34 | 20-25 | 5.6-7.3 | 0 | --- |
| | 34-60 | 0.0-5.0 | 6.6-8.4 | 0-15 | --- |
| 354. | | | | | |
| Aquolls (marsh), ponded | | | | | |
| 375: | | | | | |
| Fostoria, lacustrine substratum | 0-7 | 25-30 | 6.1-7.3 | 0 | --- |
| | 7-19 | 25-30 | 6.1-7.3 | 0 | --- |
| | 19-46 | 15-25 | 7.6-8.4 | 0-15 | --- |
| | 46-52 | 26-50 | 5.6-7.3 | 0-30 | --- |
| | 52-80 | 26-50 | 5.6-7.3 | 0-30 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 376F: | | | | | |
| Cornell | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-21 | 36-41 | 5.6-7.3 | 0 | --- |
| | 21-43 | 20-25 | 4.5-6.5 | 0 | --- |
| | 43-80 | 20-25 | 6.6-8.4 | 0-25 | --- |
| 379: | | | | | |
| Ocheyedan, lacustrine substratum | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-14 | 20-25 | 5.6-7.3 | 0 | --- |
| | 14-40 | 20-25 | 6.1-7.8 | 0-15 | --- |
| | 40-60 | 20-25 | 6.6-8.4 | 0-30 | --- |
| | 60-80 | 26-50 | 5.6-7.3 | 0-30 | --- |
| 379B: | | | | | |
| Ocheyedan, lacustrine substratum | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-14 | 20-25 | 5.6-7.3 | 0 | --- |
| | 14-40 | 20-25 | 6.1-7.8 | 0-15 | --- |
| | 40-60 | 20-25 | 6.6-8.4 | 0-30 | --- |
| | 60-80 | 26-50 | 5.6-7.3 | 0-30 | --- |
| 379C2: | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | 0-8 | 20-25 | 5.6-7.3 | 0 | --- |
| | 8-40 | 20-25 | 6.1-7.8 | 0-15 | --- |
| | 40-60 | 20-25 | 6.6-8.4 | 0-30 | --- |
| | 60-80 | 26-50 | 5.6-7.3 | 0-30 | --- |
| 384: | | | | | |
| Collinwood | 0-7 | 35-42 | 5.6-7.3 | 0 | --- |
| | 7-15 | 35-42 | 5.6-7.3 | 0 | --- |
| | 15-33 | 26-50 | 5.6-7.3 | 0 | --- |
| | 33-60 | 26-50 | 7.4-8.4 | 0-30 | --- |
| 390: | | | | | |
| Waldorf | 0-9 | 36-52 | 6.1-7.3 | 0 | --- |
| | 9-28 | 36-52 | 6.1-7.3 | 0 | --- |
| | 28-45 | 25-46 | 6.6-7.8 | 0-15 | --- |
| | 45-80 | 14-37 | 7.6-8.4 | 15-30 | --- |
| 397: | | | | | |
| Letri | 0-8 | 30-36 | 6.1-7.8 | 0 | --- |
| | 8-18 | 30-36 | 6.1-7.8 | 0 | --- |
| | 18-32 | 30-36 | 6.1-7.8 | 5-25 | --- |
| | 32-60 | 20-30 | 6.6-8.4 | 5-25 | --- |
| 433E: | | | | | |
| Moneta | 0-9 | 16-19 | 7.6-8.4 | 5-30 | --- |
| | 9-60 | 9.0-18 | 7.6-8.4 | 15-30 | --- |
| | 60-80 | 9.0-18 | 7.6-8.4 | 10-20 | --- |
| 433F: | | | | | |
| Moneta | 0-9 | 16-19 | 7.6-8.4 | 5-30 | --- |
| | 9-60 | 9.0-18 | 7.6-8.4 | 15-30 | --- |
| | 60-80 | 9.0-18 | 7.6-8.4 | 10-20 | --- |
| 433G: | | | | | |
| Moneta | 0-9 | 16-19 | 7.6-8.4 | 5-30 | --- |
| | 9-60 | 9.0-18 | 7.6-8.4 | 15-30 | --- |
| | 60-80 | 9.0-18 | 7.6-8.4 | 10-20 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 455: | | | | | |
| Wilmonton | 0-8 | 30-36 | 6.1-7.3 | 0 | --- |
| | 8-17 | 30-36 | 6.1-7.3 | 0 | --- |
| | 17-25 | 30-36 | 6.1-7.8 | 0 | --- |
| | 25-55 | 20-30 | 7.6-8.4 | 5-30 | --- |
| | 55-80 | 20-30 | 7.6-8.4 | 5-30 | --- |
| 456: | | | | | |
| Wilmonton | 0-8 | 30-36 | 6.1-7.3 | 0 | --- |
| | 8-14 | 30-36 | 6.1-7.3 | 0 | --- |
| | 14-35 | 30-36 | 6.1-7.8 | 0 | --- |
| | 35-80 | 20-30 | 7.6-8.4 | 5-30 | --- |
| 485: | | | | | |
| Spillville | 0-20 | 20-25 | 5.6-7.3 | 0 | --- |
| | 20-54 | 20-25 | 5.6-7.3 | 0 | --- |
| | 54-80 | 20-25 | 5.6-7.3 | 0 | --- |
| 506: | | | | | |
| Wacousta | 0-9 | 41-41 | 6.1-7.3 | 0-15 | --- |
| | 9-14 | 41-41 | 6.1-7.3 | 0-15 | --- |
| | 14-16 | 30-35 | 6.6-7.8 | 0-15 | --- |
| | 16-60 | 25-30 | 7.6-8.4 | 5-30 | --- |
| 507: | | | | | |
| Canisteo | 0-10 | 36-41 | 7.6-8.4 | 5-15 | --- |
| | 10-18 | 36-41 | 7.6-8.4 | 5-15 | --- |
| | 18-39 | 12-29 | 7.6-8.4 | 12-18 | --- |
| | 39-80 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 541C: | | | | | |
| Estherville | 0-7 | 15-20 | 5.6-7.3 | --- | --- |
| | 7-18 | 4.0-20 | 5.6-7.3 | --- | --- |
| | 18-80 | 0.0-5.0 | 6.6-8.4 | 0-20 | --- |
| Hawick | 0-7 | 1.0-10 | 6.1-7.8 | 0-10 | --- |
| | 7-11 | 1.0-5.0 | 6.1-7.8 | 0-10 | --- |
| | 11-73 | 1.0-5.0 | 7.6-8.4 | 5-15 | --- |
| 559: | | | | | |
| Talcot | 0-10 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 10-26 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 26-30 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 30-60 | 1.0-5.0 | 7.6-8.4 | 5-30 | --- |
| 577B: | | | | | |
| Everly | 0-8 | 25-30 | 5.6-7.3 | 0 | --- |
| | 8-12 | 25-30 | 5.6-7.3 | 0 | --- |
| | 12-26 | 25-30 | 6.1-7.3 | 0 | --- |
| | 26-80 | 25-30 | 7.6-8.4 | 5-30 | --- |
| 577C2: | | | | | |
| Everly, moderately eroded | 0-7 | 25-30 | 5.6-7.3 | 0 | --- |
| | 7-26 | 25-30 | 6.1-7.3 | 0 | --- |
| | 26-80 | 25-30 | 7.6-8.4 | 5-30 | --- |
| 637D2: | | | | | |
| Everly, moderately eroded | 0-7 | 25-30 | 5.6-7.3 | 0 | --- |
| | 7-26 | 25-30 | 6.1-7.3 | 0 | --- |
| | 26-80 | 25-30 | 7.6-8.4 | 5-30 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 637D2: | | | | | |
| Moneta, moderately eroded | 0-7 | 16-19 | 7.6-8.4 | 5-30 | --- |
| | 7-57 | 9.0-18 | 7.6-8.4 | 15-30 | --- |
| | 57-80 | 9.0-18 | 7.6-8.4 | 10-20 | --- |
| 638C2: | | | | | |
| Clarion, moderately eroded | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-16 | 20-25 | 5.6-7.3 | 0 | --- |
| | 16-35 | 20-25 | 5.6-7.3 | 0 | --- |
| | 35-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| Storden, moderately eroded | 0-7 | 15-20 | 7.6-8.4 | 5-30 | --- |
| | 7-11 | 7.0-18 | 7.6-8.4 | 5-30 | --- |
| | 11-80 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 672: | | | | | |
| May City | 0-7 | 15-20 | 5.6-6.5 | 0 | 0 |
| | 7-19 | 4.0-15 | 5.1-6.5 | 0 | 0 |
| | 19-80 | 0.0-6.0 | 5.6-6.5 | 0 | 0 |
| 672B: | | | | | |
| May City | 0-7 | 15-20 | 5.6-6.5 | 0 | 0 |
| | 7-19 | 4.0-15 | 5.1-6.5 | 0 | 0 |
| | 19-80 | 0.0-6.0 | 5.6-6.5 | 0 | 0 |
| 672C2: | | | | | |
| May City, moderately eroded | 0-7 | 15-20 | 5.6-6.5 | 0 | 0 |
| | 7-17 | 4.0-15 | 5.1-6.5 | 0 | 0 |
| | 17-80 | 0.0-6.0 | 5.6-6.5 | 0 | 0 |
| 709: | | | | | |
| Fairhaven | 0-9 | 20-30 | 5.6-7.3 | 0 | --- |
| | 9-25 | 20-30 | 5.6-7.3 | 0 | --- |
| | 25-30 | 15-25 | 5.6-7.3 | 0 | --- |
| | 30-80 | 0.0-5.0 | 6.1-8.4 | 0-15 | --- |
| 733: | | | | | |
| Calco | 0-9 | 36-41 | 7.6-8.4 | 5-30 | --- |
| | 9-27 | 36-41 | 7.6-8.4 | 5-30 | --- |
| | 27-36 | 36-41 | 7.6-8.4 | 5-30 | --- |
| | 36-80 | 36-41 | 7.6-8.4 | 5-30 | --- |
| 735: | | | | | |
| Havelock | 0-9 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 9-40 | 30-36 | 7.6-8.4 | 5-30 | --- |
| | 40-73 | 10-20 | 7.6-8.4 | 5-30 | --- |
| 740D: | | | | | |
| Hawick | 0-7 | 1.0-10 | 6.1-7.8 | 0-10 | --- |
| | 7-11 | 1.0-5.0 | 6.1-7.8 | 0-10 | --- |
| | 11-73 | 1.0-5.0 | 7.6-8.4 | 5-15 | --- |
| 810: | | | | | |
| Galva, terrace | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-17 | 36-41 | 5.6-7.3 | 0 | --- |
| | 17-31 | 36-41 | 6.1-7.3 | 0 | --- |
| | 31-45 | 36-41 | 6.6-8.4 | 0-25 | --- |
| | 45-60 | 36-41 | 7.6-8.4 | 5-30 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 810B: | | | | | |
| Galva, terrace | 0-6 | 36-41 | 5.6-7.3 | 0 | --- |
| | 6-17 | 36-41 | 5.6-7.3 | 0 | --- |
| | 17-31 | 36-41 | 6.1-7.3 | 0 | --- |
| | 31-45 | 36-41 | 6.6-8.4 | 0-25 | --- |
| | 45-60 | 36-41 | 7.6-8.4 | 5-30 | --- |
| 828B: | | | | | |
| Zenor | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-33 | 15-20 | 6.1-8.4 | 0 | --- |
| | 33-60 | 3.0-10 | 7.9-8.4 | 0-10 | --- |
| 828C2: | | | | | |
| Zenor, moderately eroded | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-30 | 15-20 | 6.1-8.4 | 0 | --- |
| | 30-60 | 3.0-10 | 7.9-8.4 | 0-10 | --- |
| 835D2: | | | | | |
| Storden, moderately eroded | 0-7 | 15-20 | 7.6-8.4 | 5-30 | --- |
| | 7-11 | 7.0-18 | 7.6-8.4 | 5-30 | --- |
| | 11-80 | 20-25 | 7.6-8.4 | 5-30 | --- |
| Omsrud, moderately eroded | 0-7 | 15-25 | 5.6-8.4 | 0 | --- |
| | 7-24 | 20-25 | 5.6-7.3 | 0 | --- |
| | 24-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 835E2: | | | | | |
| Storden, moderately eroded | 0-7 | 11-18 | 7.6-8.4 | 5-25 | --- |
| | 7-11 | 9.0-17 | 7.6-8.4 | 5-25 | --- |
| | 11-80 | 20-25 | 7.6-8.4 | 5-30 | --- |
| Omsrud, moderately eroded | 0-7 | 15-25 | 5.6-8.4 | 0 | --- |
| | 7-24 | 20-25 | 5.6-7.3 | 0 | --- |
| | 24-60 | 20-25 | 7.6-8.4 | 5-30 | --- |
| 854D. | | | | | |
| Histosols, fens | | | | | |
| 874: | | | | | |
| Dickinson, lacustrine substratum | 0-9 | 15-20 | 5.6-7.3 | 0 | --- |
| | 9-30 | 15-20 | 5.6-7.3 | 0 | --- |
| | 30-36 | 5.0-10 | 5.1-6.5 | 0 | --- |
| | 36-67 | 5.0-10 | 5.6-7.3 | 0 | --- |
| | 67-80 | 36-50 | 6.6-8.4 | 0-25 | --- |
| 874B: | | | | | |
| Dickinson, lacustrine substratum | 0-9 | 15-20 | 5.6-7.3 | 0 | --- |
| | 9-30 | 15-20 | 5.6-7.3 | 0 | --- |
| | 30-36 | 5.0-10 | 5.1-6.5 | 0 | --- |
| | 36-67 | 5.0-10 | 5.6-7.3 | 0 | --- |
| | 67-80 | 36-50 | 6.6-8.4 | 0-25 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 874C2: | | | | | |
| Dickinson, lacustrine substratum, moderately eroded--- | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-30 | 15-20 | 5.1-6.5 | 0 | --- |
| | 30-36 | 5.0-10 | 5.1-6.5 | 0 | --- |
| | 36-67 | 5.0-10 | 5.6-7.3 | 0 | --- |
| | 67-80 | 36-50 | 6.6-8.4 | 0-25 | --- |
| 875: | | | | | |
| Roine---------------- | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-48 | 15-20 | 5.6-7.3 | 0 | --- |
| | 48-52 | 15-20 | 5.6-6.5 | 0 | --- |
| | 52-59 | 36-41 | 6.6-8.4 | 0-25 | --- |
| | 59-80 | 15-20 | 5.6-6.5 | 0 | --- |
| 875B: | | | | | |
| Roine---------------- | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-48 | 15-20 | 5.6-7.3 | 0 | --- |
| | 48-52 | 15-20 | 5.6-6.5 | 0 | --- |
| | 52-59 | 36-41 | 6.6-8.4 | 0-25 | --- |
| | 59-80 | 15-20 | 5.6-6.5 | 0 | --- |
| 875C2: | | | | | |
| Roine, moderately eroded-------------- | 0-8 | 15-20 | 5.6-7.3 | 0 | --- |
| | 8-45 | 15-20 | 5.6-7.3 | 0 | --- |
| | 45-52 | 15-20 | 5.6-6.5 | 0 | --- |
| | 52-59 | 36-41 | 6.6-8.4 | 0-25 | --- |
| | 59-80 | 15-20 | 5.6-6.5 | 0 | --- |
| 878: | | | | | |
| Ocheyedan------------ | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-14 | 20-25 | 5.6-7.3 | 0 | --- |
| | 14-34 | 20-25 | 6.1-7.8 | 0-15 | --- |
| | 34-60 | 20-25 | 6.6-8.4 | 0-30 | --- |
| 878B: | | | | | |
| Ocheyedan------------ | 0-7 | 20-25 | 5.6-7.3 | 0 | --- |
| | 7-14 | 20-25 | 5.6-7.3 | 0 | --- |
| | 14-34 | 20-25 | 6.1-7.8 | 0-15 | --- |
| | 34-60 | 20-25 | 6.6-8.4 | 0-30 | --- |
| 879: | | | | | |
| Fostoria------------- | 0-7 | 25-30 | 6.1-7.3 | 0 | --- |
| | 7-19 | 25-30 | 6.1-7.3 | 0 | --- |
| | 19-34 | 15-25 | 7.6-8.4 | 5-25 | --- |
| | 34-80 | 15-25 | 7.6-8.4 | 5-25 | --- |
| 928: | | | | | |
| Annieville----------- | 0-8 | 36-41 | 5.6-7.3 | 0 | --- |
| | 8-20 | 36-41 | 5.6-7.3 | 0 | --- |
| | 20-52 | 36-41 | 6.1-7.3 | 0 | --- |
| | 52-57 | 12-25 | 6.6-7.8 | 0-15 | --- |
| | 57-80 | 36-41 | 7.6-8.4 | 5-30 | --- |
| 928B: | | | | | |
| Annieville----------- | 0-8 | 36-41 | 5.6-7.3 | 0 | --- |
| | 8-20 | 36-41 | 5.6-7.3 | 0 | --- |
| | 20-52 | 36-41 | 6.1-7.3 | 0 | --- |
| | 52-57 | 12-25 | 6.6-7.8 | 0-15 | --- |
| | 57-80 | 36-41 | 7.6-8.4 | 5-30 | --- |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 992: | | | | | |
| Gillett Grove | 0-8 | 41-45 | 6.1-7.8 | 0-15 | --- |
| | 8-17 | 41-45 | 6.1-7.8 | 0-15 | --- |
| | 17-44 | 41-45 | 6.1-8.4 | 0-25 | --- |
| | 44-57 | 36-41 | 7.9-8.4 | 20-30 | --- |
| | 57-62 | 30-36 | 7.9-8.4 | 20-30 | --- |
| 1053: | | | | | |
| Belmann, gypsum phase | 0-7 | 36-41 | 5.6-7.3 | 0 | 5-15 |
| | 7-57 | 36-41 | 5.6-7.3 | 0 | 10-20 |
| | 57-80 | 36-41 | 5.6-7.3 | 0 | 10-20 |
| 1091: | | | | | |
| McCreath | 0-6 | 41-45 | 5.6-7.3 | 0 | --- |
| | 6-17 | 41-45 | 5.6-7.3 | 0 | --- |
| | 17-35 | 36-41 | 6.1-8.4 | 0-30 | --- |
| | 35-44 | 30-36 | 7.9-8.4 | 15-30 | --- |
| | 44-80 | 30-36 | 7.9-8.4 | 15-30 | --- |
| 1092: | | | | | |
| Gillett Grove | 0-8 | 41-45 | 6.1-7.8 | 0-15 | --- |
| | 8-17 | 41-45 | 6.1-7.8 | 0-15 | --- |
| | 17-44 | 41-45 | 6.1-8.4 | 0-25 | --- |
| | 44-57 | 36-41 | 7.9-8.4 | 20-30 | --- |
| | 57-62 | 30-36 | 7.9-8.4 | 20-30 | --- |
| 1133: | | | | | |
| Colo | 0-8 | 36-41 | 5.6-7.3 | 0 | --- |
| | 8-34 | 36-41 | 5.6-7.3 | 0 | --- |
| | 34-52 | 36-41 | 5.6-7.3 | 0 | --- |
| | 52-60 | 30-36 | 6.1-7.3 | 0 | --- |
| 1259: | | | | | |
| Biscay, depressional | 0-7 | 30-36 | 6.1-7.8 | 0-15 | --- |
| | 7-21 | 30-36 | 6.1-7.8 | 0-15 | --- |
| | 21-37 | 12-25 | 6.6-7.8 | 0-15 | --- |
| | 37-42 | 5.0-20 | 6.6-7.8 | 0-15 | --- |
| | 42-60 | 1.0-5.0 | 7.6-8.4 | 5-30 | --- |
| 1385: | | | | | |
| Ocheda | 0-8 | 41-41 | 5.6-7.3 | 0 | --- |
| | 8-20 | 41-41 | 5.6-7.3 | 0 | --- |
| | 20-24 | 25-35 | 5.6-7.3 | 0 | --- |
| | 24-57 | 15-25 | 7.4-8.4 | 0-15 | --- |
| | 57-80 | 25-40 | 6.6-8.4 | 0-30 | --- |
| 1508: | | | | | |
| Belmann | 0-8 | 36-41 | 5.6-7.3 | 5-15 | --- |
| | 8-16 | 36-41 | 5.6-7.3 | 5-15 | --- |
| | 16-24 | 36-41 | 5.6-7.3 | 10-20 | --- |
| | 24-52 | 36-50 | 5.6-7.3 | 10-20 | --- |
| | 52-80 | 36-50 | 5.6-7.3 | 10-20 | --- |
| 1585: | | | | | |
| Spillville | 0-47 | 20-25 | 5.6-7.3 | 0 | --- |
| | 47-80 | 20-25 | 5.6-7.3 | 0 | --- |
| Coland | 0-39 | 30-36 | 6.1-7.3 | 0 | --- |
| | 39-60 | 20-30 | 6.1-7.8 | 0-20 | --- |
| 5010. | | | | | |
| Pits, sand and gravel | | | | | |

Table 19.--Chemical Properties of the Soils--Continued

| Map symbol and component name | Depth | Cation-exchange capacity | Soil reaction | Calcium carbon-ate | Gypsum |
|---|---|---|---|---|---|
| | In | meq/100 g | pH | Pct | Pct |
| 5040. | | | | | |
| Udorthents, loamy | | | | | |
| 5060. | | | | | |
| Pits, clay | | | | | |
| AW. | | | | | |
| Animal waste | | | | | |
| SL. | | | | | |
| Sewage lagoon | | | | | |
| W. | | | | | |
| Water | | | | | |

Table 20.--Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 6: | | | | | | | | | |
| Okoboji | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 27B: | | | | | | | | | |
| Terril | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 27C: | | | | | | | | | |
| Terril | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 27D: | | | | | | | | | |
| Terril | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 31: | | | | | | | | | |
| Afton | C/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 34B: | | | | | | | | | |
| Estherville | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 41C: | | | | | | | | | |
| Sparta | A | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 48: | | | | | | | | | |
| Knoke | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 54: | | | | | | | | | |
| Zook | C/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Long | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 55: | | | | | | | | | |
| Nicollet | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 62F: | | | | | | | | | |
| Storden | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 77B: | | | | | | | | | |
| Sac | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 77C: | | | | | | | | | |
| Sac | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 77C2: | | | | | | | | | |
| Sac, moderately eroded---- | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 90: | | | | | | | | | |
| Okoboji mucky silty clay loam--------------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 95: | | | | | | | | | |
| Harps--------------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 107: | | | | | | | | | |
| Webster------------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 108: | | | | | | | | | |
| Wadena | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 108B: | | | | | | | | | |
| Wadena | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 133: | | | | | | | | | |
| Colo | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 135: | | | | | | | | | |
| Coland | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 138B: | | | | | | | | | |
| Clarion | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 138C2: | | | | | | | | | |
| Clarion, moderately eroded | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 175: | | | | | | | | | |
| Dickinson----------------- | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 175B: | | | | | | | | | |
| Dickinson----------------- | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 191: | | | | | | | | | |
| Rushmore------------------ | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 201B: | | | | | | | | | |
| Coland-------------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 201B: | | | | | | | | | |
| Terril | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 202: | | | | | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 203: | | | | | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 221: | | | | | | | | | |
| Klossner | A/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 259: | | | | | | | | | |
| Biscay | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 274: | | | | | | | | | |
| Rolfe | C | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 282: | | | | | | | | | |
| Ransom | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 308: | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 308B: | | | | | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 354: | | | | | | | | | |
| Aquolls (marsh), ponded | --- | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| 375: | | | | | | | | | |
| Fostoria, lacustrine substratum | C | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 376F: | | | | | | | | | |
| Cornell | C | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 379: | | | | | | | | | |
| Ocheyedan, lacustrine substratum | C | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 379B: | | | | | | | | | |
| Ocheyedan, lacustrine substratum | C | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 379C2: | | | | | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | C | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 384: | | | | | | | | | |
| Collinwood | C | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 390: | | | | | | | | | |
| Waldorf | C/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 397: | | | | | | | | | |
| Letri | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 433E: | | | | | | | | | |
| Moneta | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 433F: | | | | | | | | | |
| Moneta | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 433G: | | | | | | | | | |
| Moneta | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 455: | | | | | | | | | |
| Wilmonton | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 456: | | | | | | | | | |
| Wilmonton | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 485: | | | | | | | | | |
| Spillville | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | August | 3.5-5.0 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | September | 3.5-5.0 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | October | 3.5-5.0 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Occasional |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 506: | | | | | | | | | |
| Wacousta | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 507: | | | | | | | | | |
| Canisteo | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 541C: | | | | | | | | | |
| Estherville | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| Hawick | A | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 559: | | | | | | | | | |
| Talcot | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 577B: | | | | | | | | | |
| Everly | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 577C2: | | | | | | | | | |
| Everly, moderately eroded | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 637D2: | | | | | | | | | |
| Everly, moderately eroded | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| Moneta, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 638C2: | | | | | | | | | |
| Clarion, moderately eroded | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| Storden, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 672: | | | | | | | | | |
| May City------------------ | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 672B: | | | | | | | | | |
| May City------------------ | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 672C2: | | | | | | | | | |
| May City, moderately eroded------------------- | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 709: | | | | | | | | | |
| Fairhaven----------------- | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 733: | | | | | | | | | |
| Calco--------------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 735: | | | | | | | | | |
| Havelock | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Occasional |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 740D: | | | | | | | | | |
| Hawick | A | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 810: | | | | | | | | | |
| Galva, terrace | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 810B: | | | | | | | | | |
| Galva, terrace | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 828B: | | | | | | | | | |
| Zenor | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 828C2: | | | | | | | | | |
| Zenor, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 835D2: | | | | | | | | | |
| Storden, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| Omsrud, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 835E2: | | | | | | | | | |
| Storden, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| Omsrud, moderately eroded | B | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 854D: | | | | | | | | | |
| Histosols, fens | --- | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table Upper limit | Water table Lower limit | Ponding Surface water depth | Ponding Duration | Ponding Frequency | Flooding Duration | Flooding Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 874: | | | | | | | | | |
| Dickinson, lacustrine substratum--------------- | C | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 874B: | | | | | | | | | |
| Dickinson, lacustrine substratum--------------- | C | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 874C2: | | | | | | | | | |
| Dickinson, lacustrine substratum, moderately eroded------------------- | C | | | | | | | | |
| | | Jan-Dec | --- | --- | --- | --- | None | --- | None |
| 875: | | | | | | | | | |
| Roine--------------------- | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 875B: | | | | | | | | | |
| Roine--------------------- | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 875C2: | | | | | | | | | |
| Roine, moderately eroded-- | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 878: | | | | | | | | | |
| Ocheyedan | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 878B: | | | | | | | | | |
| Ocheyedan | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 879: | | | | | | | | | |
| Fostoria | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| 928: | | | | | | | | | |
| Annieville | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydrologic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 928B: | | | | | | | | | |
| Annieville---------------- | B | | | | | | | | |
| | | January | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 4.0-6.0 | >6.0 | --- | --- | None | --- | None |
| 992: | | | | | | | | | |
| Gillett Grove------------- | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 1053: | | | | | | | | | |
| Belmann, gypsum phase----- | C | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 1091: | | | | | | | | | |
| McCreath------------------ | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 1092: | | | | | | | | | |
| Gillett Grove | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 1133: | | | | | | | | | |
| Colo | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Brief | Frequent |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 1259: | | | | | | | | | |
| Biscay, depressional | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | February | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | March | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | April | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | May | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | June | 0.0-1.0 | >6.0 | 0.0-1.0 | Long | Frequent | --- | None |
| | | July | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | August | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | September | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | October | 0.0-6.0 | >6.0 | 0.0-1.0 | Brief | Rare | --- | None |
| | | November | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| | | December | 0.0-1.0 | >6.0 | 0.0-1.0 | Brief | Occasional | --- | None |
| 1385: | | | | | | | | | |
| Ocheda | C | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |

Table 20.--Water Features--Continued

| Map symbol and component name | Hydro-logic group | Month | Water table: Upper limit | Water table: Lower limit | Ponding: Surface water depth | Ponding: Duration | Ponding: Frequency | Flooding: Duration | Flooding: Frequency |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ft | Ft | Ft | | | | |
| 1508: | | | | | | | | | |
| Belmann | C | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 1585: | | | | | | | | | |
| Spillville | B | | | | | | | | |
| | | January | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| | | February | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | March | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | April | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | May | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | June | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | July | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | August | 3.5-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | September | 3.5-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | October | 3.5-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | November | 1.0-3.5 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | December | 1.0-3.5 | >6.0 | --- | --- | None | --- | None |
| Coland | B/D | | | | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | March | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | April | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | May | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | June | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | July | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | August | 0.0-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | September | 0.0-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | October | 0.0-6.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | November | 0.0-1.0 | >6.0 | --- | --- | None | Very brief | Frequent |
| | | December | 0.0-1.0 | >6.0 | --- | --- | None | --- | None |
| 5010. | | | | | | | | | |
| Pits, sand and gravel | | | | | | | | | |
| 5040. | | | | | | | | | |
| Udorthents, loamy | | | | | | | | | |
| 5060. | | | | | | | | | |
| Pits, clay | | | | | | | | | |
| AW. | | | | | | | | | |
| Animal waste | | | | | | | | | |
| SL. | | | | | | | | | |
| Sewage lagoon | | | | | | | | | |
| W. | | | | | | | | | |
| Water | | | | | | | | | |

Table 21.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

| Map symbol and component name | Subsidence | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|
| | Initial | Total | | Uncoated steel | Concrete |
| | In | In | | | |
| 6: | | | | | |
| Okoboji | --- | --- | High | High | Low. |
| 27B: | | | | | |
| Terril | --- | --- | Moderate | Moderate | Low. |
| 27C: | | | | | |
| Terril | --- | --- | Moderate | Moderate | Low. |
| 27D: | | | | | |
| Terril | --- | --- | Moderate | Moderate | Low. |
| 31: | | | | | |
| Afton | --- | --- | High | High | Low. |
| 34B: | | | | | |
| Estherville | --- | --- | Low | Low | Low. |
| 41C: | | | | | |
| Sparta | --- | --- | Low | Low | Moderate. |
| 48: | | | | | |
| Knoke | --- | --- | High | High | Low. |
| 54: | | | | | |
| Zook | --- | --- | High | High | Moderate. |
| 55: | | | | | |
| Nicollet | --- | --- | High | High | Low. |
| 62F: | | | | | |
| Storden | --- | --- | Moderate | Low | Low. |
| 77B: | | | | | |
| Sac | --- | --- | High | Moderate | Low. |
| 77C: | | | | | |
| Sac | --- | --- | High | Moderate | Low. |
| 77C2: | | | | | |
| Sac, moderately eroded | --- | --- | High | Moderate | Low. |
| 90: | | | | | |
| Okoboji mucky silty clay loam | --- | --- | High | High | Low. |
| 95: | | | | | |
| Harps | --- | --- | High | High | Low. |
| 107: | | | | | |
| Webster | --- | --- | High | High | Low. |
| 108: | | | | | |
| Wadena | --- | --- | Low | Low | Low. |
| 108B: | | | | | |
| Wadena | --- | --- | Low | Low | Low. |

Table 21.--Soil Features--Continued

| Map symbol and component name | Subsidence: Initial | Subsidence: Total | Potential for frost action | Risk of corrosion: Uncoated steel | Risk of corrosion: Concrete |
|---|---|---|---|---|---|
| | In | In | | | |
| 133: | | | | | |
| Colo | --- | --- | High | High | Moderate. |
| 135: | | | | | |
| Coland | --- | --- | High | High | Low. |
| 138B: | | | | | |
| Clarion | --- | --- | Moderate | Low | Low. |
| 138C2: | | | | | |
| Clarion, moderately eroded | --- | --- | Moderate | Low | Low. |
| 175: | | | | | |
| Dickinson | --- | --- | Moderate | Low | Moderate. |
| 175B: | | | | | |
| Dickinson | --- | --- | Moderate | Low | Moderate. |
| 191: | | | | | |
| Rushmore | --- | --- | High | High | Low. |
| 201B: | | | | | |
| Coland | --- | --- | High | High | Low. |
| Terril | --- | --- | Moderate | Moderate | Low. |
| 202: | | | | | |
| Cylinder, 24 to 32 inches to sand and gravel | --- | --- | High | Moderate | Low. |
| 203: | | | | | |
| Cylinder, 32 to 40 inches to sand and gravel | --- | --- | High | Moderate | Low. |
| 221: | | | | | |
| Klossner | 2-4 | 25-32 | High | High | Moderate. |
| 259: | | | | | |
| Biscay | --- | --- | High | Moderate | Low. |
| 274: | | | | | |
| Rolfe | --- | --- | High | High | Moderate. |
| 282: | | | | | |
| Ransom | --- | --- | High | High | Low. |
| 308: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | --- | --- | Low | Low | Low. |
| 308B: | | | | | |
| Wadena, 32 to 40 inches to sand and gravel | --- | --- | Low | Low | Low. |
| 354. | | | | | |
| Aquolls (marsh), ponded | | | | | |

Table 21.--Soil Features--Continued

| Map symbol and component name | Subsidence | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|
| | Initial | Total | | Uncoated steel | Concrete |
| | In | In | | | |
| 375: | | | | | |
| Fostoria, lacustrine substratum | --- | --- | High | High | Low. |
| 376F: | | | | | |
| Cornell | --- | --- | Moderate | Moderate | Moderate. |
| 379: | | | | | |
| Ocheyedan, lacustrine substratum | --- | --- | High | High | Low. |
| 379B: | | | | | |
| Ocheyedan, lacustrine substratum | --- | --- | High | High | Low. |
| 379C2: | | | | | |
| Ocheyedan, lacustrine substratum, moderately eroded | --- | --- | High | High | Low. |
| 384: | | | | | |
| Collinwood | --- | --- | High | High | Low. |
| 390: | | | | | |
| Waldorf | --- | --- | High | High | Low. |
| 397: | | | | | |
| Letri | --- | --- | High | High | Low. |
| 433E: | | | | | |
| Moneta | --- | --- | Moderate | Low | Low. |
| 433F: | | | | | |
| Moneta | --- | --- | Moderate | Low | Low. |
| 433G: | | | | | |
| Moneta | --- | --- | Moderate | Low | Low. |
| 455: | | | | | |
| Wilmonton | --- | --- | High | Moderate | Low. |
| 456: | | | | | |
| Wilmonton | --- | --- | High | Moderate | Low. |
| 485: | | | | | |
| Spillville | --- | --- | Moderate | High | Moderate. |
| 506: | | | | | |
| Wacousta | --- | --- | High | High | Low. |
| 507: | | | | | |
| Canisteo | --- | --- | High | High | Low. |
| 541C: | | | | | |
| Estherville | --- | --- | Low | Low | Low. |
| Hawick | --- | --- | Low | Low | Low. |

Table 21.--Soil Features--Continued

| Map symbol and component name | Subsidence Initial | Subsidence Total | Potential for frost action | Risk of corrosion Uncoated steel | Risk of corrosion Concrete |
|---|---|---|---|---|---|
| | In | In | | | |
| 559: | | | | | |
| Talcot | --- | --- | High | High | Low. |
| 577B: | | | | | |
| Everly | --- | --- | Moderate | Moderate | Moderate. |
| 577C2: | | | | | |
| Everly, moderately eroded | --- | --- | Moderate | Moderate | Moderate. |
| 637D2: | | | | | |
| Everly, moderately eroded | --- | --- | Moderate | Moderate | Moderate. |
| Moneta, moderately eroded | --- | --- | Moderate | Moderate | Moderate. |
| 638C2: | | | | | |
| Clarion, moderately eroded | --- | --- | Moderate | Low | Low. |
| Storden, moderately eroded | --- | --- | Moderate | Low | Low. |
| 672: | | | | | |
| May City | --- | --- | Low | Low | High. |
| 672B: | | | | | |
| May City | --- | --- | Low | Low | High. |
| 672C2: | | | | | |
| May City, moderately eroded | --- | --- | Low | Low | High. |
| 709: | | | | | |
| Fairhaven | --- | --- | Moderate | Low | Moderate. |
| 733: | | | | | |
| Calco | --- | --- | High | High | Low. |
| 735: | | | | | |
| Havelock | --- | --- | High | High | Low. |
| 740D: | | | | | |
| Hawick | --- | --- | Low | Low | Low. |
| 810: | | | | | |
| Galva, terrace | --- | --- | High | Moderate | Moderate. |
| 810B: | | | | | |
| Galva, terrace | --- | --- | High | Moderate | Moderate. |
| 828B: | | | | | |
| Zenor | --- | --- | Low | Low | Low. |
| 828C2: | | | | | |
| Zenor, moderately eroded | --- | --- | Low | Low | Low. |
| 835D2: | | | | | |
| Storden, moderately eroded | --- | --- | Moderate | Low | Low. |

Table 21.--Soil Features--Continued

| Map symbol and component name | Subsidence | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|
| | Initial | Total | | Uncoated steel | Concrete |
| | In | In | | | |
| 835D2: | | | | | |
| Omsrud, moderately eroded | --- | --- | Moderate | Low | Low. |
| 835E2: | | | | | |
| Storden, moderately eroded | --- | --- | Moderate | Low | Low. |
| Omsrud, moderately eroded | --- | --- | Moderate | Low | Low. |
| 854D. | | | | | |
| Histosols, fens | | | | | |
| 874: | | | | | |
| Dickinson, lacustrine substratum | --- | --- | High | High | Low. |
| 874B: | | | | | |
| Dickinson, lacustrine substratum | --- | --- | High | High | Low. |
| 874C2: | | | | | |
| Dickinson, lacustrine substratum, moderately eroded | --- | --- | High | High | Low. |
| 875: | | | | | |
| Roine | --- | --- | Moderate | Low | Moderate. |
| 875B: | | | | | |
| Roine | --- | --- | Moderate | Low | Moderate. |
| 875C2: | | | | | |
| Roine, moderately eroded | --- | --- | Moderate | Low | Moderate. |
| 878: | | | | | |
| Ocheyedan | --- | --- | Moderate | Low | Low. |
| 878B: | | | | | |
| Ocheyedan | --- | --- | Moderate | Low | Low. |
| 879: | | | | | |
| Fostoria | --- | --- | High | High | Low. |
| 928: | | | | | |
| Annieville | --- | --- | High | Moderate | Moderate. |
| 928B: | | | | | |
| Annieville | --- | --- | High | Moderate | Moderate. |
| 992: | | | | | |
| Gillett Grove | --- | --- | High | High | Low. |
| 1053: | | | | | |
| Belmann, gypsum phase | --- | --- | High | High | High. |

Table 21.--Soil Features--Continued

| Map symbol and component name | Subsidence | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|
| | Initial | Total | | Uncoated steel | Concrete |
| | In | In | | | |
| 1091: | | | | | |
| McCreath | --- | --- | High | Moderate | Moderate. |
| 1092: | | | | | |
| Gillett Grove | --- | --- | High | High | Low. |
| 1133: | | | | | |
| Colo | --- | --- | High | High | Low. |
| 1259: | | | | | |
| Biscay, depressional | --- | --- | High | Moderate | Low. |
| 1385: | | | | | |
| Ocheda | --- | --- | High | High | Low. |
| 1508: | | | | | |
| Belmann | --- | --- | High | High | Low. |
| 1585: | | | | | |
| Spillville | --- | --- | Moderate | High | Moderate. |
| Coland | --- | --- | High | High | Low. |
| 5010. | | | | | |
| Pits, sand and gravel | | | | | |
| 5040. | | | | | |
| Udorthents, loamy | | | | | |
| 5060. | | | | | |
| Pits, clay | | | | | |
| AW. | | | | | |
| Animal waste | | | | | |
| SL. | | | | | |
| Sewage lagoon | | | | | |
| W. | | | | | |
| Water | | | | | |

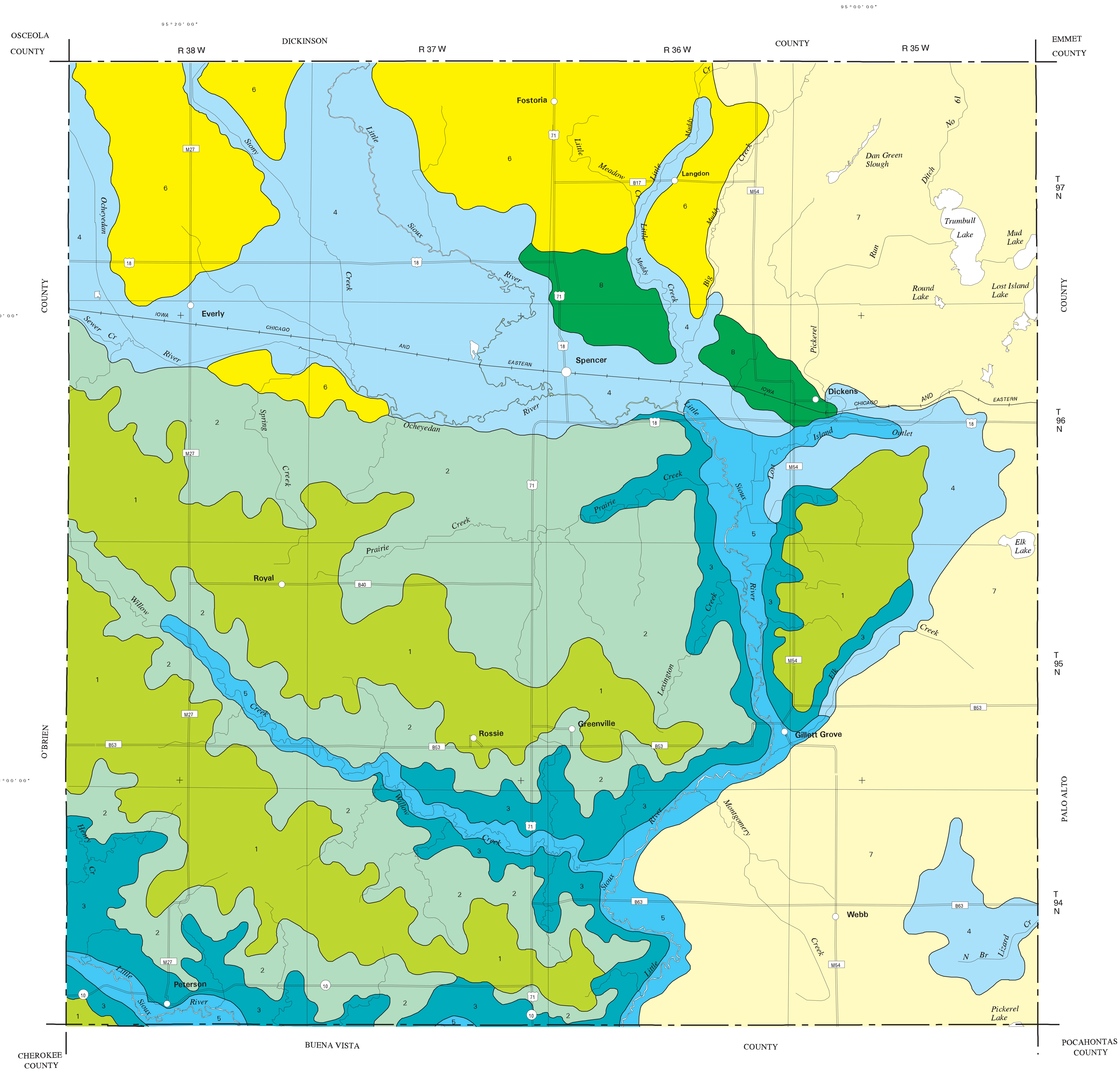
Table 22.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)

| Soil name | Family or higher taxonomic class |
|---|---|
| Afton | Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls |
| Annieville | Fine-silty, mixed, superactive, mesic Typic Hapludolls |
| Belmann | Fine, smectitic, mesic Vertic Endoaquolls |
| Biscay | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Endoaquolls |
| Calco | Fine-silty, mixed, superactive, calcareous, mesic Cumulic Endoaquolls |
| Calcousta | Fine-silty, mixed, superactive, calcareous, mesic Typic Endoaquolls |
| Canisteo | Fine-loamy, mixed, superactive, calcareous, mesic Typic Endoaquolls |
| Clarion | Fine-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Clarion | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Coland | Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls |
| Collinwood | Fine, smectitic, mesic Aquertic Hapludolls |
| Colo | Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls |
| Cornell | Fine, smectitic, mesic Oxyaquic Vertic Argiudolls |
| Crippin | Fine-loamy, mixed, superactive, mesic Aquic Hapludolls |
| Cylinder | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aquic Hapludolls |
| Dickinson | Coarse-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Dickinson | Coarse-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Dickman | Sandy, mixed, mesic Typic Hapludolls |
| Estherville | Sandy, mixed, mesic Typic Hapludolls |
| *Estherville | Sandy, mixed, mesic Typic Eutrudepts |
| Everly | Fine-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Everly | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Fairhaven | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludolls |
| Fostoria | Fine-loamy, mixed, superactive, mesic Aquic Hapludolls |
| Galva | Fine-silty, mixed, superactive, mesic Typic Hapludolls |
| Gillett Grove | Fine-silty, mixed, superactive, mesic Typic Endoaquolls |
| Guckeen | Fine, smectitic, mesic Aquertic Hapludolls |
| Hanlon | Coarse-loamy, mixed, superactive, mesic Cumulic Hapludolls |
| Harps | Fine-loamy, mixed, superactive, mesic Typic Calciaquolls |
| Havelock | Fine-loamy, mixed, superactive, calcareous, mesic Cumulic Endoaquolls |
| Hawick | Sandy, mixed, mesic Entic Hapludolls |
| *Hawick | Mixed, mesic Typic Udipsamments |
| Klossner | Loamy, mixed, euic, mesic Terric Medisaprists |
| Knoke | Fine, smectitic, calcareous, mesic Vertic Endoaquolls |
| Letri | Fine-loamy, mixed, superactive, mesic Typic Endoaquolls |
| May City | Loamy-skeletal, mixed, superactive, mesic Typic Hapludolls |
| *May City | Loamy-skeletal, mixed, superactive, mesic Typic Eutrudepts |
| McCreath | Fine-silty, mixed, superactive, mesic Aquic Hapludolls |
| Moneta | Fine-loamy, mixed, superactive, mesic Entic Hapludolls |
| Nicollet | Fine-loamy, mixed, superactive, mesic Aquic Hapludolls |
| Ocheda | Fine, smectitic, mesic Aquertic Hapludolls |
| Ocheyedan | Fine-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Ocheyedan | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Okoboji | Fine, smectitic, mesic Cumulic Vertic Endoaquolls |
| *Omsrud | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Primghar | Fine-silty, mixed, superactive, mesic Aquic Hapludolls |
| Ransom | Fine-silty, mixed, superactive, mesic Aquic Hapludolls |
| Ridgeport | Coarse-loamy, mixed, superactive, mesic Typic Hapludolls |
| Roine | Coarse-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Roine | Loamy-skeletal, mixed, mesic Typic Eutrudepts |
| Rolfe | Fine, smectitic, mesic Typic Argialbolls |
| Rushmore | Fine-silty, mixed, superactive, mesic Typic Endoaquolls |
| Sac | Fine-silty, mixed, superactive, mesic Oxyaquic Hapludolls |
| *Sac | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |

Table 22.--Classification of the Soils--Continued

| Soil name | Family or higher taxonomic class |
|---|---|
| Shandep | Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls |
| Sparta | Sandy, mixed, mesic Entic Hapludolls |
| Spillville | Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls |
| Storden | Fine-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Sunburg | Coarse-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Talcot | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, mesic Typic Endoaquolls |
| Terril | Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls |
| Wacousta | Fine-silty, mixed, superactive, mesic Typic Endoaquolls |
| Wadena | Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludolls |
| Waldorf | Fine, smectitic, mesic Vertic Epiaquolls |
| Webster | Fine-loamy, mixed, superactive, mesic Typic Endoaquolls |
| Wilmonton | Fine-loamy, mixed, superactive, mesic Aquic Hapludolls |
| Zenor | Coarse-loamy, mixed, superactive, mesic Typic Hapludolls |
| *Zenor | Coarse-loamy, mixed, superactive, mesic Typic Eutrudepts |
| Zook | Fine, smectitic, mesic Cumulic Vertic Endoaquolls |




LEGEND

| | |
|---|---|
| 1 | McCreath - Gillett Grove - Sac Association |
| 2 | Wilmonton - Ransom - Afton Association |
| 3 | Moneta - Cornell Association |
| 4 | Wadena - Cylinder - Biscay Association |
| 5 | Colo - Zook - Spillville Association |
| 6 | Everly - Letri - Fostoria Association |
| 7 | Clarion - Nicollet - Webster Association |
| 8 | Belmann - Fostoria, lacustrine substratum - Waldorf Association |

Compiled 2002

SECTIONALIZED TOWNSHIP

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

N

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE,
IOWA STATE UNIVERSITY
DIVISION OF SOIL CONSERVATION,
IOWA DEPARTMENT OF AGRICULTURE
AND LAND STEWARDSHIP

# GENERAL SOIL MAP
## CLAY COUNTY, IOWA

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:100000

*Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.*


SECTIONALIZED TOWNSHIP

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

N

INDEX TO MAP SHEETS
CLAY COUNTY, IOWA

MILES

KILOMETERS

SCALE = 1:100000

# SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. An uppercase letter following these numbers indicates the class of slope. Symbols without a letter indicating the class of slope are for nearly level soils. A final number of 2 following the slope letter indicates that the map unit is predominantly moderately eroded.

| SYMBOL | NAME |
|---|---|
| 6 | Okoboji silty clay loam, depressional, 0 to 1 percent slopes |
| 27B | Terril loam, 2 to 5 percent slopes |
| 27C | Terril loam, 5 to 9 percent slopes |
| 27D | Terril loam, 9 to 14 percent slopes |
| 31 | Afton silty clay loam, 0 to 2 percent slopes |
| 34B | Estherville sandy loam, 2 to 5 percent slopes |
| 41C | Sparta loamy sand, 5 to 9 percent slopes |
| 48 | Knoke mucky silty clay loam, depressional, 0 to 1 percent slopes |
| 54 | Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded |
| 55 | Nicollet loam, 1 to 3 percent slopes |
| 62F | Storden loam, 18 to 25 percent slopes |
| 77B | Sac silty clay loam, 2 to 5 percent slopes |
| 77C | Sac silty clay loam, 5 to 9 percent slopes |
| 77C2 | Sac silty clay loam, 5 to 9 percent slopes, moderately eroded |
| 90 | Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes |
| 95 | Harps loam, 0 to 2 percent slopes |
| 107 | Webster silty clay loam, 0 to 2 percent slopes |
| 108 | Wadena loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes |
| 108B | Wadena loam, 24 to 32 inches to sand and gravel, 2 to 5 percent slopes |
| 133 | Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded |
| 135 | Coland clay loam, 0 to 2 percent slopes, occasionally flooded |
| 138B | Clarion loam, 2 to 5 percent slopes |
| 138C2 | Clarion loam, 5 to 9 percent slopes, moderately eroded |
| 175 | Dickinson fine sandy loam, 0 to 2 percent slopes |
| 175B | Dickinson fine sandy loam, 2 to 5 percent slopes |
| 191 | Rushmore silty clay loam, 0 to 2 percent slopes |
| 201B | Coland-Terril complex, 1 to 5 percent slopes |
| 202 | Cylinder loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes |
| 203 | Cylinder loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 221 | Klossner muck, depressional, 0 to 1 percent slopes |
| 259 | Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 274 | Rolfe silt loam, depressional, 0 to 1 percent slopes |
| 282 | Ransom silty clay loam, 1 to 3 percent slopes |
| 308 | Wadena loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 308B | Wadena loam, 32 to 40 inches to sand and gravel, 2 to 5 percent slopes |
| 354 | Aquolls (marsh), ponded, 0 to 1 percent slopes |
| 375 | Fostoria clay loam, lacustrine substratum, 1 to 3 percent slopes |
| 376F | Cornell silty clay loam, 18 to 25 percent slopes |
| 379 | Ocheyedan clay loam, lacustrine substratum, 0 to 2 percent slopes |
| 379B | Ocheyedan clay loam, lacustrine substratum, 2 to 5 percent slopes |
| 379C2 | Ocheyedan clay loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded |
| 384 | Collinwood clay, 1 to 3 percent slopes |
| 390 | Waldorf silty clay, 0 to 2 percent slopes |
| 397 | Letri clay loam, 0 to 2 percent slopes |
| 433E | Moneta clay loam, 14 to 18 percent slopes |
| 433F | Moneta clay loam, 18 to 25 percent slopes |
| 433G | Moneta clay loam, 25 to 40 percent slopes |
| 455 | Wilmonton clay loam, 1 to 3 percent slopes |
| 456 | Wilmonton silty clay loam, 1 to 3 percent slopes |

| SYMBOL | NAME |
|---|---|
| 485 | Spillville loam, 0 to 2 percent slopes, occasionally flooded |
| 506 | Wacousta silty clay loam, depressional, 0 to 1 percent slopes |
| 507 | Canisteo clay loam, 0 to 2 percent slopes |
| 541C | Estherville-Hawick complex, 5 to 9 percent slopes |
| 559 | Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 577B | Everly clay loam, 2 to 5 percent slopes |
| 577C2 | Everly clay loam, 5 to 9 percent slopes, moderately eroded |
| 637D2 | Everly-Moneta complex, 9 to 14 percent slopes, moderately eroded |
| 638C2 | Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded |
| 672 | May City sandy clay loam, 0 to 2 percent slopes |
| 672B | May City sandy clay loam, 2 to 5 percent slopes |
| 672C2 | May City sandy clay loam, 5 to 9 percent slopes, moderately eroded |
| 709 | Fairhaven silt loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes |
| 733 | Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded |
| 735 | Havelock clay loam, 0 to 2 percent slopes, occasionally flooded |
| 740D | Hawick gravelly loamy sand, 9 to 14 percent slopes |
| 810 | Galva silty clay loam, terrace, 0 to 2 percent slopes |
| 810B | Galva silty clay loam, terrace, 2 to 5 percent slopes |
| 828B | Zenor sandy loam, 2 to 5 percent slopes |
| 828C2 | Zenor sandy loam, 5 to 9 percent slopes, moderately eroded |
| 835D2 | Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded |
| 835E2 | Storden-Omsrud complex, 14 to 18 percent slopes, moderately eroded |
| 854D | Histosols, fens, 2 to 25 percent slopes |
| 874 | Dickinson sandy loam, lacustrine substratum, 0 to 2 percent slopes |
| 874B | Dickinson sandy loam, lacustrine substratum, 2 to 5 percent slopes |
| 874C2 | Dickinson sandy loam, lacustrine substratum, 5 to 9 percent slopes, moderately eroded |
| 875 | Roine fine sandy loam, 0 to 2 percent slopes |
| 875B | Roine fine sandy loam, 2 to 5 percent slopes |
| 875C2 | Roine fine sandy loam, 5 to 9 percent slopes, moderately eroded |
| 878 | Ocheyedan loam, 0 to 2 percent slopes |
| 878B | Ocheyedan loam, 2 to 5 percent slopes |
| 879 | Fostoria loam, 1 to 3 percent slopes |
| 928 | Annieville silty clay loam, 0 to 2 percent slopes |
| 928B | Annieville silty clay loam, 2 to 5 percent slopes |
| 992 | Gillett Grove silty clay loam, depressional, 0 to 1 percent slopes |
| 1053 | Belmann clay loam, gypsum phase, 0 to 2 percent slopes |
| 1091 | McCreath silty clay loam, 0 to 2 percent slopes |
| 1092 | Gillett Grove silty clay loam, 0 to 2 percent slopes |
| 1133 | Colo silty clay loam, channeled, 0 to 2 percent slopes, frequently flooded |
| 1259 | Biscay clay loam, 32 to 40 inches to sand and gravel, depressional, 0 to 1 percent slopes |
| 1385 | Ocheda silty clay loam, 1 to 3 percent slopes |
| 1508 | Belmann clay loam, 0 to 2 percent slopes |
| 1585 | Spillville-Coland complex, channeled, 0 to 2 percent slopes, frequently flooded |
| 4000 | Urban land |
| 5010 | Pits, sand and gravel |
| 5040 | Udorthents, loamy (cut and fill land) |
| 5060 | Pits, clay |
| AW | Animal waste |
| SL | Sewage lagoon |
| W | Water |

# CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

## SOIL SURVEY FEATURES

SOIL DELINEATIONS AND SYMBOLS 77B 27B

STANDARD LANDFORM AND MISCELLANEOUS SURFACE FEATURES

- Non-bedrock escarpment
- Gully
- Levee
- Short steep slope
- Gravel pit
- Gravelly spot
- Marsh or swamp
- Sandy spot
- Severely eroded spot
- Wet spot

AD HOC FEATURES

- Calcareous spot
- Disturbed / reclaimed land
- Glacial till spot
- Gypsum spot
- Wet depression, restricted permeability
- Wet depression, ponded
- Knoll of better drained soil

## CULTURAL FEATURES

BOUNDARIES

- County or parish
- Field sheet matchline and neatline
- Public Land Survey System Section Corner Tics
- Airport, airfield
- Cemetery
- City/county park

ROAD EMBLEM & DESIGNATIONS

- Federal 287 410 224
- State 52 52 347
- County, farm or ranch 1283

LOCATED OBJECTS

- Church
- School

DAMS

- Medium or Small

## HYDROGRAPHIC FEATURES

- Perennial stream
- Intermittent
- Drainage end (Indicates direction of flow)
- Crossable with usual farm equipment
- Not crossable with usual farm equipment
- Perennial drainage

## Definitions of Special Symbols

| Name | Definition |
|---|---|
| Escarpment, nonbedrock | A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow, poorly developed soil. |
| Calcareous spot | An area of soil containing enough calcium carbonate to effervesce strongly when treated with cold, dilute hydrochloric acid. Typically 0.25 acre to 2.0 acres. |
| Disturbed/reclaimed land | An area where the soil profile is disturbed but little or no soil material has been removed. Typically 0.25 acre to 2.0 acres. |
| Glacial till spot | An area of unsorted, nonstratified glacial drift consisting of clay, silt, sand, cobbles, stones, and boulders. The areas may or may not be calcareous. Typically 0.25 acre to 2.0 acres. |
| Gravel pit | An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel. Typically 0.5 acre to 2.0 acres. |
| Gravelly spot | A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area with less than 15 percent rock fragments. Typically 0.2 acre to 2.0 acres. |
| Gully | A very small channel with steep sides cut by running water and through which water ordinarily runs only after a rain or after melting of ice or snow. It generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage. |
| Gypsum spot | An area of soil that contains an appreciable amount of gypsum (calcium sulfate). Typically 0.25 acre to 2.0 acres. |
| Knoll of better drained soil | An area of soil that is at least two drainage classes drier than the named soils in the surrounding map unit. Typically 0.25 acre to 2.0 acres. |
| Levee | An embankment built to confine or control water, especially one built along the banks of a river to prevent overflow onto lowlands. |
| Marsh or swamp | A water-saturated, very poorly drained area intermittently or permanently covered by water. Marshes are dominantly covered by sedges, cattails, and rushes. Swamps are dominantly covered by trees. Typically 0.5 acre to 2.0 acres. |
| Sandy spot | A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer. Typically 0.2 acre to 2.0 acres. |

| Name | Definition |
|---|---|
| Severely eroded spot | An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which “severely eroded,” “very severely eroded,” or “gullied” is part of the map unit name. Typically 0.2 acre to 2.0 acres |
| Short steep slope | A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit. |
| Wet depression | A shallow, closed depression that is subject to ponding. Typically 0.25 acre to 2.0 acres. |
| Wet depression, restricted permeability | A shallow, concave area that typically has a gray subsurface layer that restricts permeability. Typically 0.5 acre to 2.0 acres. |
| Wet spot | A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit. Typically 0.2 acre to 2.0 acres. |

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
MAY CITY SE QUADRANGLE
SHEET NUMBER 1 OF 63


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

2 LAKE PARK SE SW
10 HARTLEY NE
11 EVERLY NW
INDEX TO ADJOINING 3.75 MAPS

MAY CITY SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 1 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
LAKE PARK SE SW QUADRANGLE
SHEET NUMBER 2 OF 63

95°22′30″ 95°18′45″

R. 38 W.

43°18′45″ 43°18′45″

Joins sheet 1, May City SE


Joins sheet 3, Lake Park SE SE

T. 98 N.
T. 97 N.

43°15′00″ 43°15′00″

R. 38 W.

95°22′30″ 95°18′45″

Joins sheet 10, Hartley NE

Joins sheet 11, Everly NW

Joins sheet 12, Everly NE

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | | |
| 1 | | 3 |
| 10 | 11 | 12 |

1 MAY CITY SE
3 LAKE PARK SE SE
10 HARTLEY NE
11 EVERLY NW
12 EVERLY NE

INDEX TO ADJOINING 3.75 MAPS

LAKE PARK SE SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 2 OF 63

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UNITED STATES
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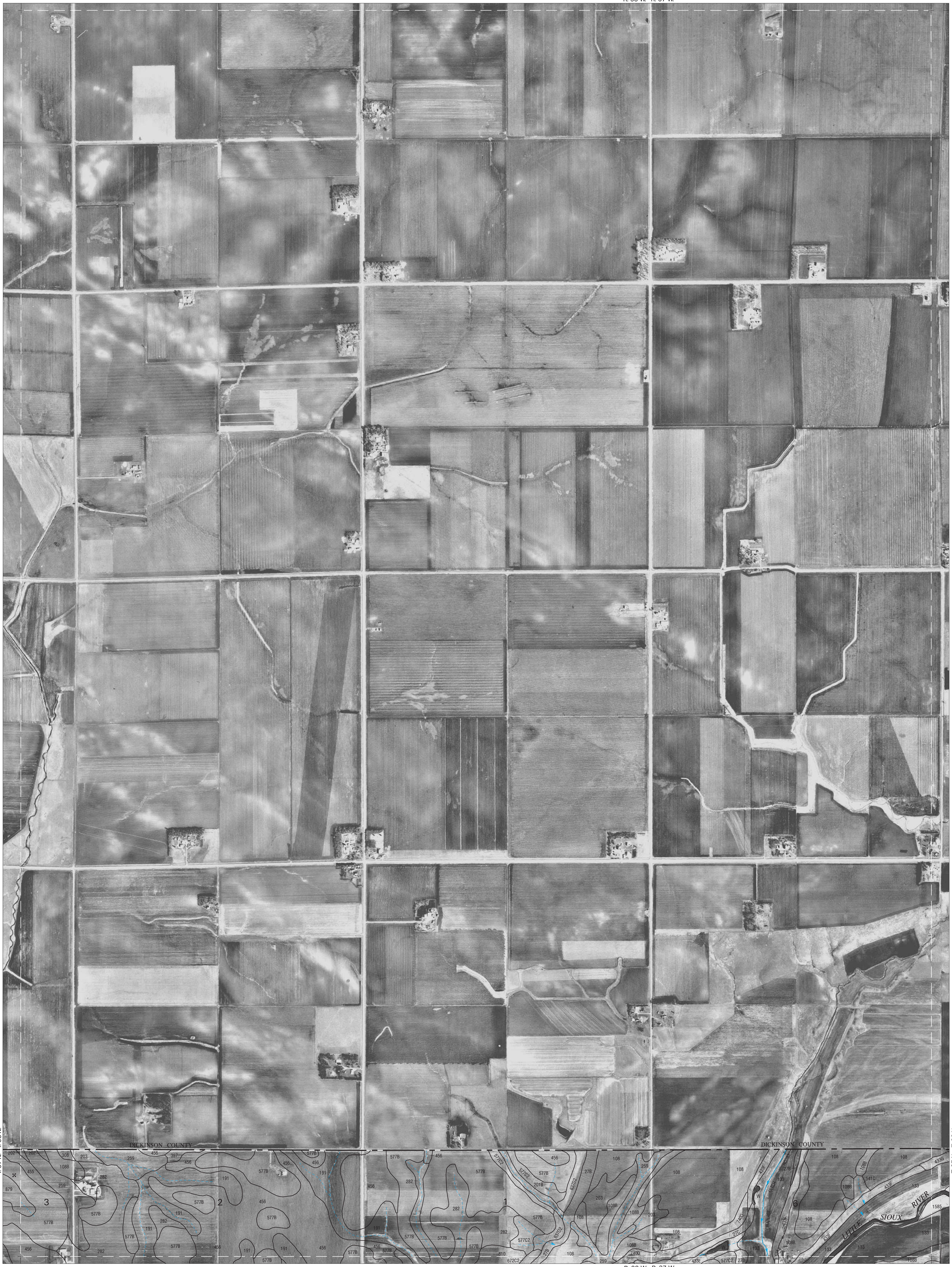
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
LAKE PARK SE SE QUADRANGLE
SHEET NUMBER 3 OF 63

95°18′45″ 95°15′00″

R. 38 W. R. 37 W.

43°18′45″ 43°18′45″




Joins sheet 2, Lake Park SE SW

Joins sheet 4, Milford SW

43°15′00″ 43°15′00″

R. 38 W. R. 37 W.

95°18′45″ 95°15′00″

Joins sheet 11, Everly NW

Joins sheet 12, Everly NE

Joins sheet 13, Spencer NW

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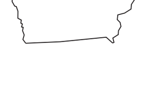
North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | | |
| 2 | | 4 |
| 11 | 12 | 13 |

2 LAKE PARK SE SW
4 MILFORD SW
11 EVERLY NW
12 EVERLY NE
13 SPENCER NW

INDEX TO ADJOINING 3.75 MAPS

LAKE PARK SE SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 3 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

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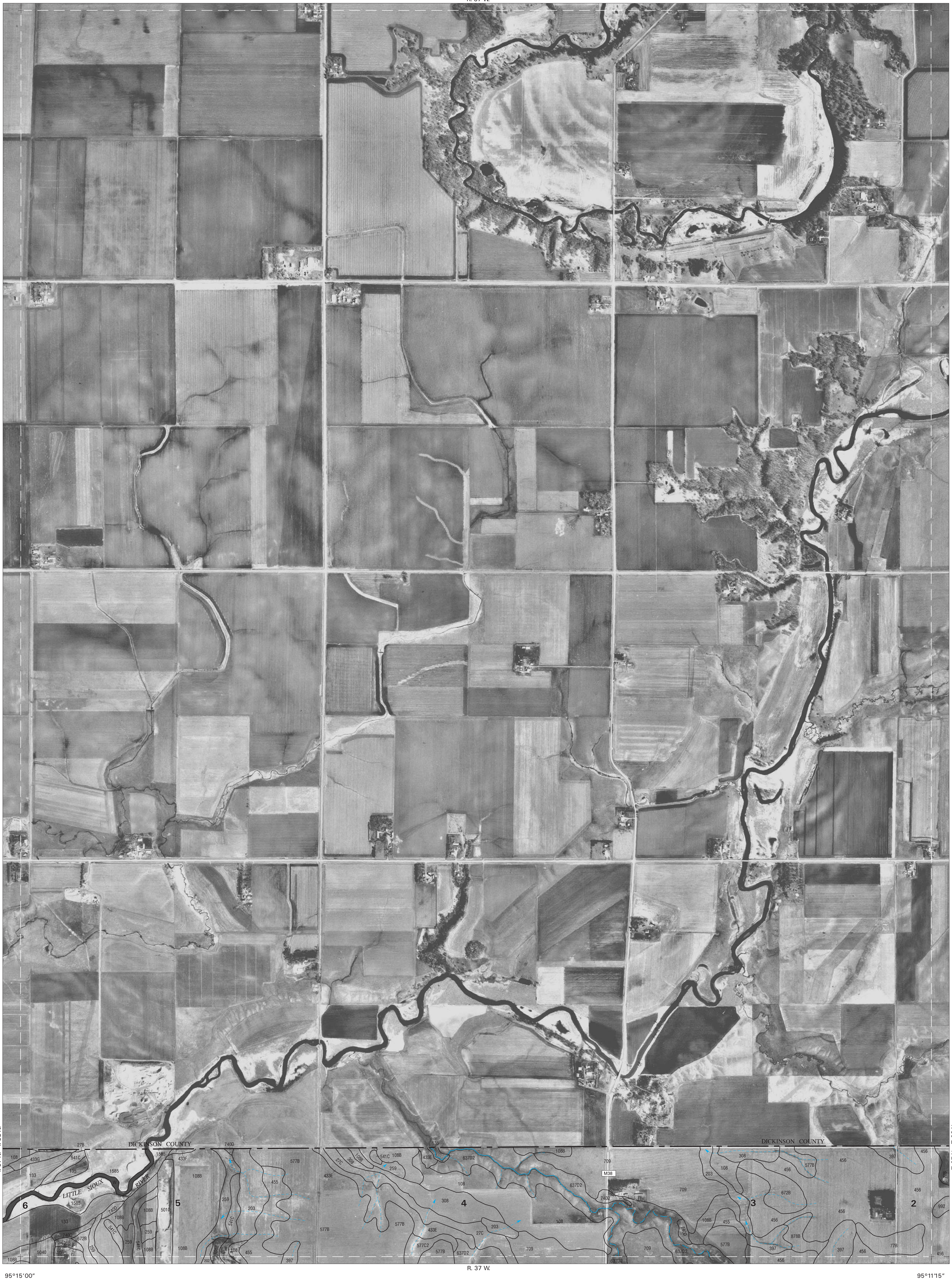
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
MILFORD SW QUADRANGLE
SHEET NUMBER 4 OF 63




Joins sheet 12, Everly NE

Joins sheet 13, Spencer NW

Joins sheet 14, Spencer NE

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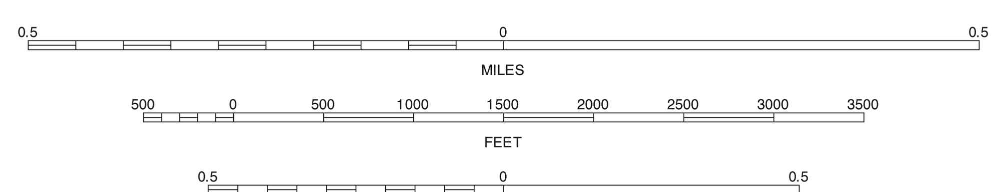
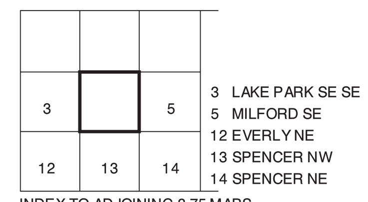
North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.


SCALE 1:12000




MILFORD SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 4 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
MILFORD SE QUADRANGLE
SHEET NUMBER 5 OF 63

95°11′15″ R. 37 W. R. 36 W. 95°07′30″

43°18′45″


43°15′00″

95°11′15″ R. 37 W. R. 36 W. 95°07′30″

Joins sheet 13, Spencer NW

Joins sheet 14, Spencer NE

Joins sheet 15, Dickens NW

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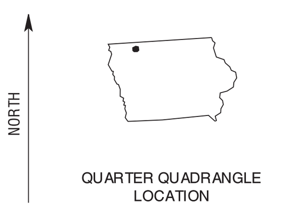
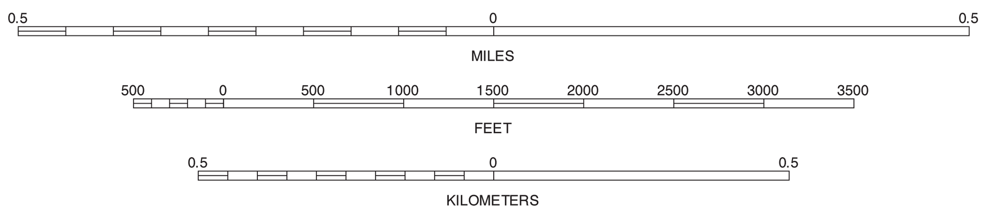
North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000




| | | |
|---|---|---|
| | | |
| 4 | | 6 |
| 13 | 14 | 15 |

4 MILFORD SW
6 SPIRIT LAKE SE SW
13 SPENCER NW
14 SPENCER NE
15 DICKENS NW

INDEX TO ADJOINING 3.75 MAPS

MILFORD SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 5 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



95° 07′30″ 95° 03′45″

R. 36 W.

43°18′45″ 43°18′45″

Joins sheet 5, Milford SE

Joins sheet 7, Spirit Lake SE SE


43°15′00″ 43°15′00″

R. 36 W.

95° 07′30″ 95° 03′45″

Joins sheet 14, Spencer NE

Joins sheet 15, Dickens NW

Joins sheet 16, Dickens NE

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North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | | |
| 5 | | 7 |
| 14 | 15 | 16 |

5 MILFORD SE
7 SPIRIT LAKE SE SE
14 SPENCER NE
15 DICKENS NW
16 DICKENS NE

INDEX TO ADJOINING 3.75 MAPS

## SPIRIT LAKE SE SW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 6 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

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North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

INDEX TO ADJOINING 3.75 MAPS

6 SPIRIT LAKE SE SW
8 TERRIL SW
15 DICKENS NW
16 DICKENS NE
17 RUTHVEN NW

SPIRIT LAKE SE SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 7 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE




Joins sheet 16, Dickens NE

Joins sheet 17, Ruthven NW

Joins sheet 18, Ruthven NE

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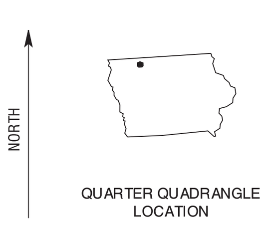
North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE
LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | | |
| 7 | | 9 |
| 16 | 17 | 18 |

7 SPIRIT LAKE SE SE
9 TERRIL SE
16 DICKENS NE
17 RUTHVEN NW
18 RUTHVEN NE

INDEX TO ADJOINING 3.75 MAPS

## TERRIL SW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 8 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
TERRIL SE QUADRANGLE
SHEET NUMBER 9 OF 63

94°56′15″ R. 35 W. R. 34 W. 94°52′30″

43°18′45″ 43°18′45″

Joins sheet 8, Terril SW


43°15′00″ 43°15′00″

94°56′15″ R. 35 W. R. 34 W. 94°52′30″

Joins sheet 17, Ruthven NW

Joins sheet 18, Ruthven NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | | |
| 8 | ■ | |
| 17 | 18 | |

8 TERRIL SW
17 RUTHVEN NW
18 RUTHVEN NE

INDEX TO ADJOINING 3.75 MAPS

TERRIL SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 9 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
HARTLEY NE QUADRANGLE
SHEET NUMBER 10 OF 63

Joins sheet 1, May City SE

Joins sheet 2, Lake Park SE SW

95° 26′15″ R. 39 W. R. 38 W. 95° 22′30″

43°15′00″ 43°15′00″


Joins sheet 11, Everly NW

43°11′15″ 43°11′15″

95° 26′15″ R. 39 W. R. 38 W. 95° 22′30″

Joins sheet 19, Hartley SE

Joins sheet 20, Everly SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1 MAY CITY SE
2 LAKE PARK SE SW
11 EVERLY NW
19 HARTLEY SE
20 EVERLY SW

INDEX TO ADJOINING 3.75 MAPS

HARTLEY NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 10 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
EVERLY NW QUADRANGLE
SHEET NUMBER 11 OF 63

Joins sheet 1, May City SE

Joins sheet 2, Lake Park SE SW

Joins sheet 3, Lake Park SE SE

95° 22′30″ | 95°18′45″

43°15′00″ | 43°15′00″

R. 38 W.


T. 97 N.

Joins sheet 10, Hartley NE

Joins sheet 12, Everly NE

43°11′15″ | 43°11′15″

R. 38 W.

95° 22′30″ | 95°18′45″

Joins sheet 19, Hartley SE

Joins sheet 20, Everly SW

Joins sheet 21, Everly SE

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North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

0.5 — 0 — 0.5 KILOMETERS

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 10 | | 12 |
| 19 | 20 | 21 |

1 MAY CITY SE
2 LAKE PARK SE SW
3 LAKE PARK SE SE
10 HARTLEY NE
12 EVERLY NE
19 HARTLEY SE
20 EVERLY SW
21 EVERLY SE

INDEX TO ADJOINING 3.75 MAPS

EVERLY NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 11 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
EVERLY NE QUADRANGLE
SHEET NUMBER 12 OF 63

Joins sheet 2, Lake Park SE SW

Joins sheet 3, Lake Park SE SE

Joins sheet 4, Milford SW

95°18′45″ R. 38 W. R. 37 W. 95°15′00″

43°15′00″ 43°15′00″


Joins sheet 11, Everly NW

T. 97 N. T. 97 N.

Joins sheet 13, Spencer NW

43°11′15″ 43°11′15″

95°18′45″ R. 38 W. R. 37 W. 95°15′00″

Joins sheet 20, Everly SW

Joins sheet 21, Everly SE

Joins sheet 22, Spencer SW

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 2 | 3 | 4 |
| 11 | | 13 |
| 20 | 21 | 22 |

2 LAKE PARK SE SW
3 LAKE PARK SE SE
4 MILFORD SW
11 EVERLY NW
13 SPENCER NW
20 EVERLY SW
21 EVERLY SE
22 SPENCER SW

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# EVERLY NE, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 12 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SPENCER NW QUADRANGLE
SHEET NUMBER 13 OF 63

Joins sheet 3, Lake Park SE SE

Joins sheet 4, Milford SW

Joins sheet 5, Milford SE

95°15′00″ R. 37 W. 95°11′15″

43°15′00″ 43°15′00″

Joins sheet 12, Everly NE

T. 97 N.


T. 97 N.

Joins sheet 14, Spencer NE

43°11′15″ 43°11′15″

95°15′00″ R. 37 W. 95°11′15″

Joins sheet 21, Everly SE

Joins sheet 22, Spencer SW

Joins sheet 23, Spencer SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

| | | |
|---|---|---|
| 3 | 4 | 5 |
| 12 | | 14 |
| 21 | 22 | 23 |

3 LAKE PARK SE SE
4 MILFORD SW
5 MILFORD SE
12 EVERLY NE
14 SPENCER NE
21 EVERLY SE
22 SPENCER SW
23 SPENCER SE

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SPENCER NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 13 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
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CLAY COUNTY, IOWA
SPENCER NE QUADRANGLE
SHEET NUMBER 14 OF 63

Joins sheet 4, Milford SW

Joins sheet 5, Milford SE

Joins sheet 6, Spirit Lake SE SW

95°11'15"

R. 37 W. R. 36 W.

95° 07'30"

43°15'00"


T. 97 N.

Joins sheet 13, Spencer NW

Joins sheet 15, Dickens NW

43°11'15"

R. 37 W. R. 36 W.

95°11'15"

95° 07'30"

Joins sheet 22, Spencer SW

Joins sheet 23, Spencer SE

Joins sheet 24, Dickens SW

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North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 4 | 5 | 6 |
| 13 | | 15 |
| 22 | 23 | 24 |

4 MILFORD SW
5 MILFORD SE
6 SPIRIT LAKE SE SW
13 SPENCER NW
15 DICKENS NW
22 SPENCER SW
23 SPENCER SE
24 DICKENS SW

INDEX TO ADJOINING 3.75 MAPS

SPENCER NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 14 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

*Joins sheet 6, Milford SE*

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

*Joins sheet 6, Spirit Lake SE SW*

CLAY COUNTY, IOWA
DICKENS NW QUADRANGLE
SHEET NUMBER 15 OF 63

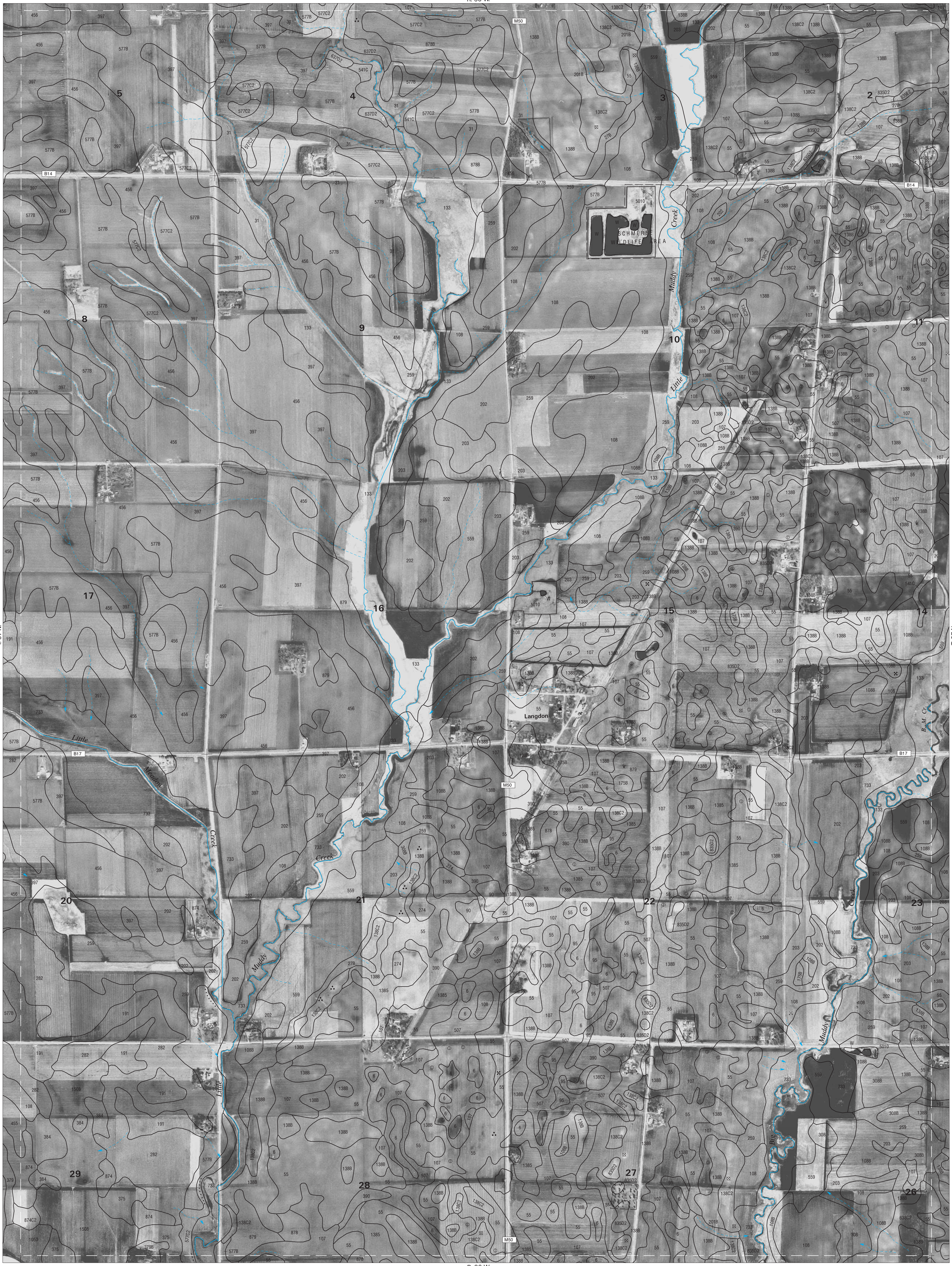
*Joins sheet 7, Spirit Lake SE SE*

95° 07′30″ — 95° 03′45″

43°15′00″

R. 36 W.

*Joins sheet 14, Spencer NE* — *Joins sheet 16, Dickens NE*




43°11′15″

R. 36 W.

95° 07′30″ — 95° 03′45″

*Joins sheet 23, Spencer SE* — *Joins sheet 24, Dickens SW* — *Joins sheet 25, Dickens SE*

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North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 — 0 — 0.5
MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500
FEET

0.5 — 0 — 0.5
KILOMETERS

| | | |
|---|---|---|
| 5 | 6 | 7 |
| 14 | | 16 |
| 23 | 24 | 25 |

5 MILFORD SE
6 SPIRIT LAKE SE SW
7 SPIRIT LAKE SE SE
14 SPENCER NE
16 DICKENS NE
23 SPENCER SE
24 DICKENS SW
25 DICKENS SE

INDEX TO ADJOINING 3.75 MAPS

# DICKENS NW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 15 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
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CLAY COUNTY, IOWA
DICKENS NE QUADRANGLE
SHEET NUMBER 16 OF 63

Joins sheet 6, Spirit Lake SE SW

Joins sheet 7, Spirit Lake SE SE

Joins sheet 8, Terril SW


Joins sheet 15, Dickens NW

Joins sheet 17, Ruthven NW

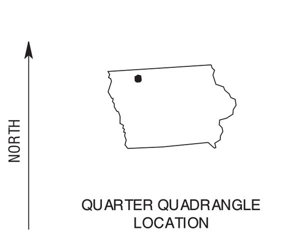
Joins sheet 24, Dickens SW

Joins sheet 25, Dickens SE

Joins sheet 26, Ruthven SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

| | | |
|---|---|---|
| 6 | 7 | 8 |
| 15 | | 17 |
| 24 | 25 | 26 |

6 SPIRIT LAKE SE SW
7 SPIRIT LAKE SE SE
8 TERRIL SW
15 DICKENS NW
17 RUTHVEN NW
24 DICKENS SW
25 DICKENS SE
26 RUTHVEN SW

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# DICKENS NE, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 16 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
RUTHVEN NW QUADRANGLE
SHEET NUMBER 17 OF 63

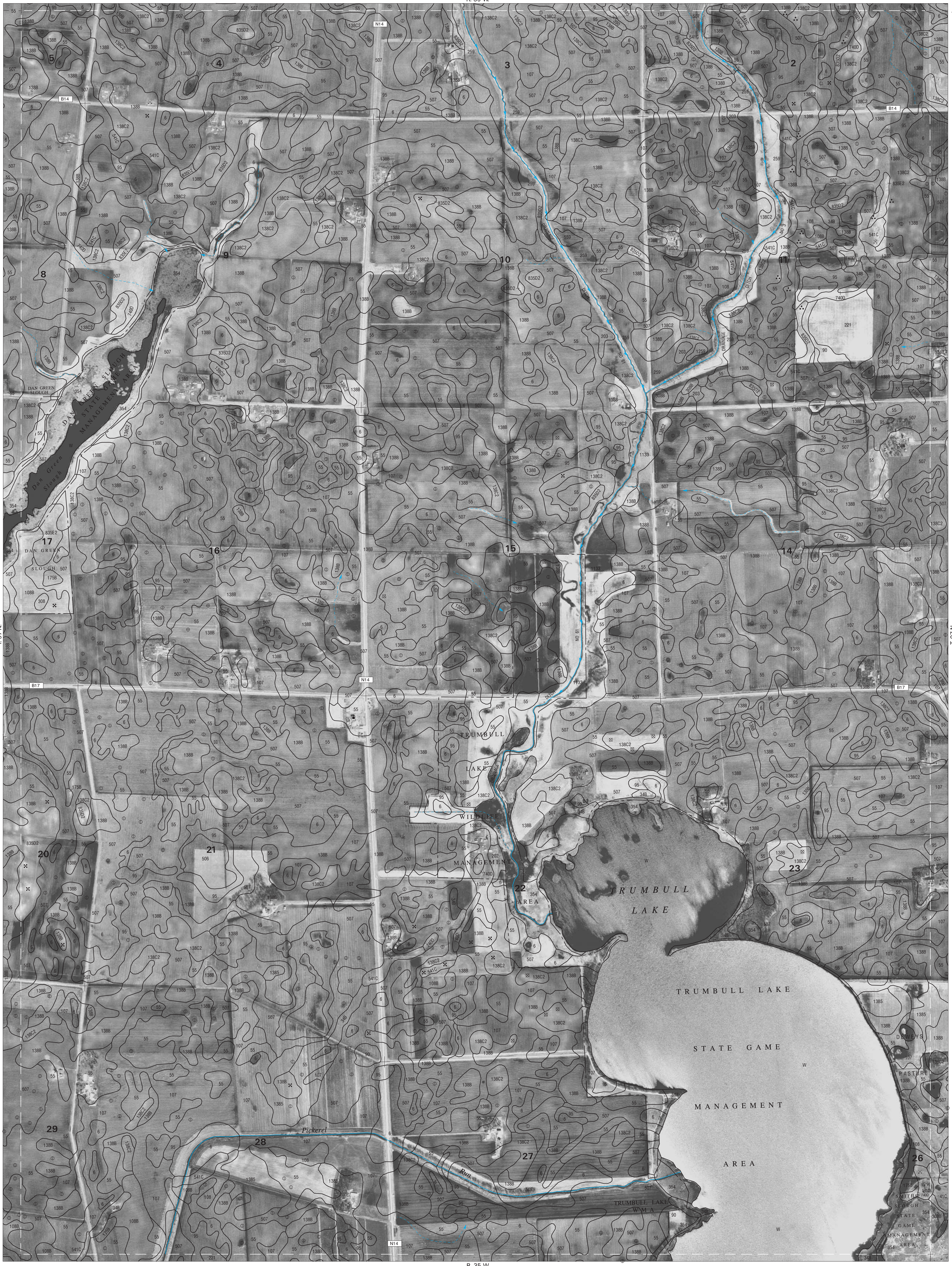
Joins sheet 7, Spirit Lake SE SE

Joins sheet 8, Terril SW

Joins sheet 9, Terril SE

95° 00′00″ R. 35 W. 94° 56′15″

43°15′00″ 43°15′00″




T. 97 N. T. 97 N.

Joins sheet 16, Dickens NE

Joins sheet 18, Ruthven NE

43°11′15″ R. 35 W. 43°11′15″

95° 00′00″ 94° 56′15″

Joins sheet 25, Dickens SE

Joins sheet 26, Ruthven SW

Joins sheet 27, Ruthven SE

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North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 7 | 8 | 9 |
| 16 | | 18 |
| 25 | 26 | 27 |

7 SPIRIT LAKE SE SE
8 TERRIL SW
9 TERRIL SE
16 DICKENS NE
18 RUTHVEN NE
25 DICKENS SE
26 RUTHVEN SW
27 RUTHVEN SE

INDEX TO ADJOINING 3.75 MAPS

RUTHVEN NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 17 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 9, Terril SE

CLAY COUNTY, IOWA
RUTHVEN NE QUADRANGLE
SHEET NUMBER 18 OF 63

94°56′15″ R. 35 W. R. 34 W. 94°52′30″

43°15′00″ 43°15′00″

Joins sheet 17, Ruthven NW

T. 97 N. T. 97 N.


43°11′15″ 43°11′15″

94°56′15″ R. 35 W. R. 34 W. 94°52′30″

Joins sheet 26, Ruthven SW

Joins sheet 27, Ruthven SE

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North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| 8 | 9 | |
|---|---|---|
| 17 | ■ | |
| 26 | 27 | |

8 TERRIL SW
9 TERRIL SE
17 RUTHVEN NW
26 RUTHVEN SW
27 RUTHVEN SE

INDEX TO ADJOINING 3.75 MAPS

RUTHVEN NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 18 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

# CLAY COUNTY, IOWA
HARTLEY SE QUADRANGLE
SHEET NUMBER 19 OF 63

Joins sheet 10, Hartley NE

Joins sheet 11, Everly NW

95° 26'15"  R. 39 W.  R. 38 W.  95° 22'30"

43°11'15"  43°11'15"

T. 96 N.  T. 97 N.


Joins sheet 20, Everly SW

43° 07'30"  43° 07'30"

95° 26'15"  R. 39 W.  R. 38 W.  95° 22'30"

Joins sheet 28, Hartley SW NE

Joins sheet 29, Royal NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5  0  0.5
MILES

500  0  500  1000  1500  2000  2500  3000  3500
FEET

0.5  0  0.5
KILOMETERS

| 10 | 11 | 10 HARTLEY NE |
|---|---|---|
| | 20 | 11 EVERLY NW |
| 28 | 29 | 20 EVERLY SW |
| | | 28 HARTLEY SW NE |
| | | 29 ROYAL NW |

INDEX TO ADJOINING 3.75 MAPS

## HARTLEY SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 19 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 10, Hartley NE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 11, Everly NW

CLAY COUNTY, IOWA
EVERLY SW QUADRANGLE
SHEET NUMBER 20 OF 63

Joins sheet 12, Everly NE

95° 22′30″ R. 38 W. 95°18′45″

43°11′15″ 43°11′15″

T. 96 N. T. 97 N.

Joins sheet 19, Hartley SE


Joins sheet 21, Everly SE

43° 07′30″ 43° 07′30″

95° 22′30″ R. 38 W. 95°18′45″

Joins sheet 28, Hartley SW NE

Joins sheet 29, Royal NW

Joins sheet 30, Royal NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 10 | 11 | 12 |
| 19 | | 21 |
| 28 | 29 | 30 |

10 HARTLEY NE
11 EVERLY NW
12 EVERLY NE
19 HARTLEY SE
21 EVERLY SE
28 HARTLEY SW NE
29 ROYAL NW
30 ROYAL NE

INDEX TO ADJOINING 3.75 MAPS

EVERLY SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 20 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 11, Everly NW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 12, Everly NE

CLAY COUNTY, IOWA
EVERLY SE QUADRANGLE
SHEET NUMBER 21 OF 63

Joins sheet 13, Spencer NW


95°18′45″

R. 38 W. R. 37 W.

95°15′00″

Joins sheet 29, Royal NW

Joins sheet 30, Royal NE

Joins sheet 31, Greenville NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 11 | 12 | 13 |
| 20 | | 22 |
| 29 | 30 | 31 |

11 EVERLY NW
12 EVERLY NE
13 SPENCER NW
20 EVERLY SW
22 SPENCER SW
29 ROYAL NW
30 ROYAL NE
31 GREENVILLE NW

INDEX TO ADJOINING 3.75 MAPS

EVERLY SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 21 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 12, Everly NE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SPENCER SW QUADRANGLE
SHEET NUMBER 22 OF 63

Joins sheet 14, Spencer NE

Joins sheet 13, Spencer NW

95°15′00″ 95°11′15″

43°11′15″ R. 37 W. 43°11′15″


T. 96 N. T. 97 N.

Joins sheet 21, Everly SE

Joins sheet 23, Spencer SE

43°07′30″ R. 37 W. 43°07′30″

95°15′00″ 95°11′15″

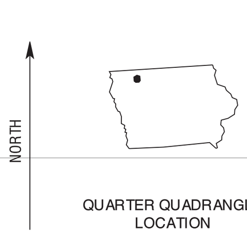
Joins sheet 30, Royal NE

Joins sheet 31, Greenville NW

Joins sheet 32, Greenville NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 12 | 13 | 14 |
| 21 | | 23 |
| 30 | 31 | 32 |

12 EVERLY NE
13 SPENCER NW
14 SPENCER NE
21 EVERLY SE
23 SPENCER SE
30 ROYAL NE
31 GREENVILLE NW
32 GREENVILLE NE

INDEX TO ADJOINING 3.75 MAPS

SPENCER SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 22 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SPENCER SE QUADRANGLE
SHEET NUMBER 23 OF 63

Joins sheet 13, Spencer NW

Joins sheet 14, Spencer NE

Joins sheet 15, Dickens NW


95°11′15″ 95°07′30″

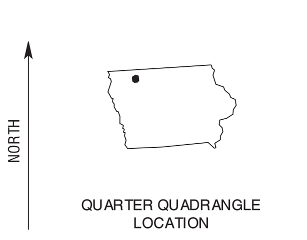
Joins sheet 31, Greenville NW

Joins sheet 32, Greenville NE

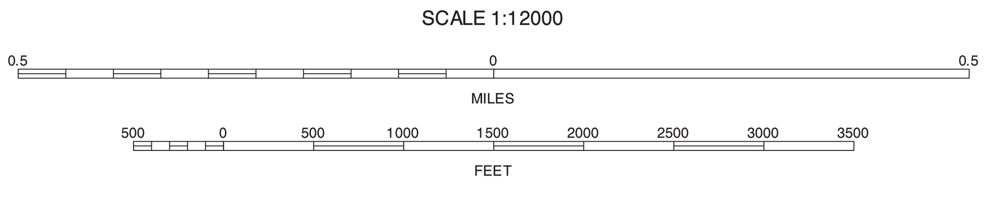
Joins sheet 33, Gillett Grove NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




SCALE 1:12000




| 13 | 14 | 15 |
| --- | --- | --- |
| 22 | | 24 |
| 31 | 32 | 33 |

13 SPENCER NW
14 SPENCER NE
15 DICKENS NW
22 SPENCER SW
24 DICKENS SW
31 GREENVILLE NW
32 GREENVILLE NE
33 GILLETT GROVE NW

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SPENCER SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 23 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 14, Spencer NE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 15, Dickens NW

CLAY COUNTY, IOWA
DICKENS SW QUADRANGLE
SHEET NUMBER 24 OF 63

Joins sheet 16, Dickens NE

95° 07′30″ R. 36 W. 95° 03′45″

43° 11′15″ 43° 11′15″

T. 96 N. T. 97 N.

Joins sheet 23, Spencer SE


Joins sheet 25, Dickens SE

43° 07′30″ R. 36 W. 43° 07′30″

95° 07′30″ 95° 03′45″

Joins sheet 32, Greenville NE

Joins sheet 33, Gillett Grove NW

Joins sheet 34, Gillett Grove NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 14 | 15 | 16 |
| 23 | | 25 |
| 32 | 33 | 34 |

14 SPENCER NE
15 DICKENS NW
16 DICKENS NE
23 SPENCER SE
25 DICKENS SE
32 GREENVILLE NE
33 GILLETT GROVE NW
34 GILLETT GROVE NE

INDEX TO ADJOINING 3.75 MAPS

DICKENS SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 24 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 15, Dickens NW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
DICKENS SE QUADRANGLE
SHEET NUMBER 25 OF 63

Joins sheet 17, Ruthven NW

Joins sheet 16, Dickens NE

95° 03′45″ R. 36 W. R. 35 W. 95° 00′00″

43°11′15″ 43°11′15″

T. 96 N. T. 97 N.

Joins sheet 24, Dickens SW


Joins sheet 26, Ruthven SW

43° 07′30″ 43° 07′30″

95° 03′45″ R. 36 W. R. 35 W. 95° 00′00″

Joins sheet 34, Gillett Grove NE

Joins sheet 33, Gillett Grove NW

Joins sheet 35, Silver Lake NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

| 15 | 16 | 17 |
|---|---|---|
| 24 | | 26 |
| 33 | 34 | 35 |

15 DICKENS NW
16 DICKENS NE
17 RUTHVEN NW
24 DICKENS SW
26 RUTHVEN SW
33 GILLETT GROVE NW
34 GILLETT GROVE NE
35 SILVER LAKE NW

INDEX TO ADJOINING 3.75 MAPS

DICKENS SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 63

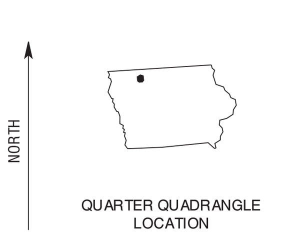
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

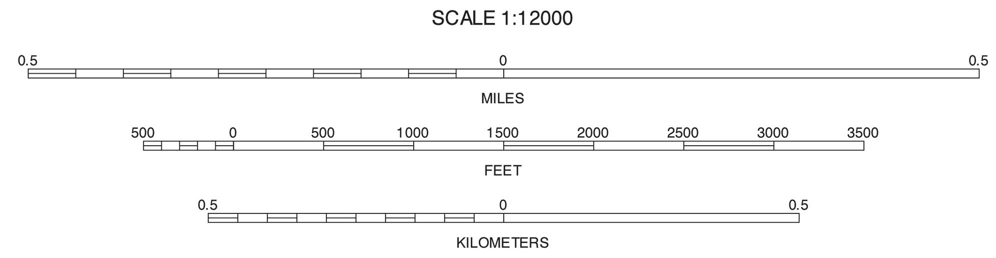
CLAY COUNTY, IOWA
RUTHVEN SW QUADRANGLE
SHEET NUMBER 26 OF 63


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




SCALE 1:12000




| | | |
|---|---|---|
| 16 | 17 | 18 |
| 25 | | 27 |
| 34 | 35 | 36 |

16 DICKENS NE
17 RUTHVEN NW
18 RUTHVEN NE
25 DICKENS SE
27 RUTHVEN SE
34 GILLETT GROVE NE
35 SILVER LAKE NW
36 SILVER LAKE NE

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RUTHVEN SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 26 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
RUTHVEN SE QUADRANGLE
SHEET NUMBER 27 OF 63

Joins sheet 17, Ruthven NW

Joins sheet 18, Ruthven NE

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

43° 11′15″


T. 96 N. T. 97 N.

Joins sheet 26, Ruthven SW

43° 07′30″

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

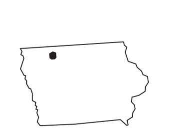
Joins sheet 35, Silver Lake NW

Joins sheet 36, Silver Lake NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 17 | 18 | |
| 26 | | |
| 35 | 36 | |

17 RUTHVEN NW
18 RUTHVEN NE
26 RUTHVEN SW
35 SILVER LAKE NW
36 SILVER LAKE NE

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# RUTHVEN SE, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 27 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
HARTLEY SW NE QUADRANGLE
SHEET NUMBER 28 OF 63

Joins sheet 19, Hartley SE

Joins sheet 20, Everly SW


Joins sheet 29, Royal NW

Joins sheet 37, Hartley SW SE

Joins sheet 38, Royal SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83), GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

| | | |
|---|---|---|
| 19 | 20 | |
| | ■ | 29 |
| 37 | 38 | |

19 HARTLEY SE
20 EVERLY SW
29 ROYAL NW
37 HARTLEY SW SE
38 ROYAL SW

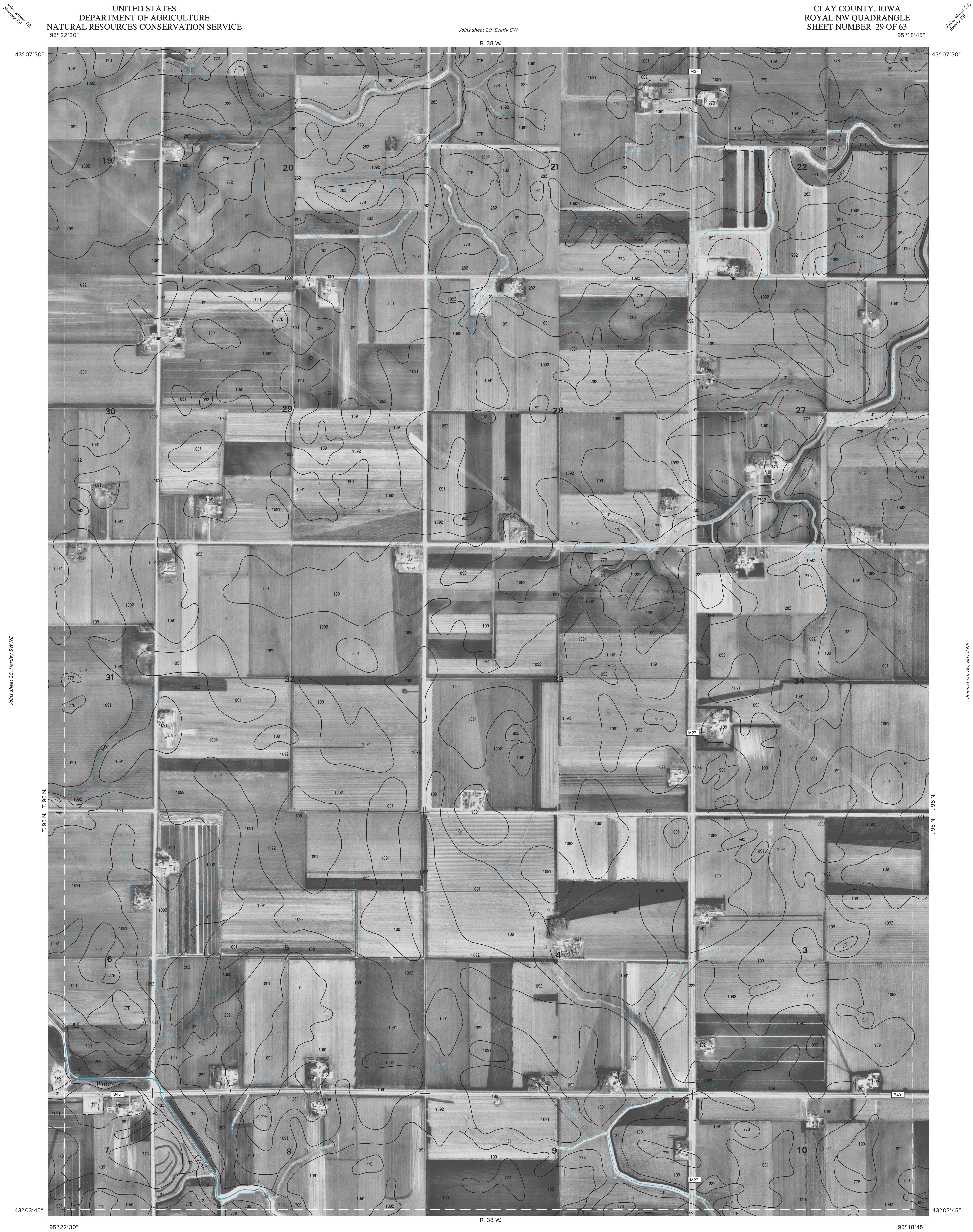
INDEX TO ADJOINING 3.75 MAPS

HARTLEY SW NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 28 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

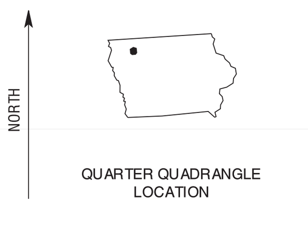
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
ROYAL NW QUADRANGLE
SHEET NUMBER 29 OF 63



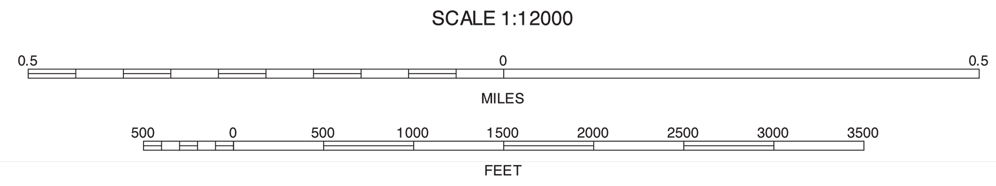

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE
LOCATION

SCALE 1:12000




| | | | |
|---|---|---|---|
| 19 | 20 | 21 | 19 HARTLEY SE<br>20 EVERLY SW<br>21 EVERLY SE |
| 28 | | 30 | 28 HARTLEY SW NE<br>30 ROYAL NE |
| 37 | 38 | 39 | 37 HARTLEY SW SE<br>38 ROYAL SW<br>39 ROYAL SE |

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# ROYAL NW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 29 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
ROYAL NE QUADRANGLE
SHEET NUMBER 30 OF 63

Joins sheet 20, Everly SW

Joins sheet 21, Everly SE

Joins sheet 22, Spencer SW

95°18′45″ 95°15′00″

43°07′30″

R. 38 W. R. 37 W.


Joins sheet 29, Royal NW

Joins sheet 31, Greenville NW

T. 95 N. T. 96 N.

43°03′45″

R. 38 W. R. 37 W.

95°18′45″ 95°15′00″

Joins sheet 38, Royal SW

Joins sheet 39, Royal SE

Joins sheet 40, Greenville SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 20 | 21 | 22 |
| 29 | | 31 |
| 38 | 39 | 40 |

20 EVERLY SW
21 EVERLY SE
22 SPENCER SW
29 ROYAL NW
31 GREENVILLE NW
38 ROYAL SW
39 ROYAL SE
40 GREENVILLE SW

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ROYAL NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 30 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
GREENVILLE NW QUADRANGLE
SHEET NUMBER 31 OF 63

Joins sheet 21, Everly SE

Joins sheet 22, Spencer SW

Joins sheet 23, Spencer SE

95°15′00″ R. 37 W. 95°11′15″

43°07′30″ 43°07′30″


43°03′45″ 43°03′45″

95°15′00″ R. 37 W. 95°11′15″

Joins sheet 30, Royal NE

Joins sheet 32, Greenville NE

Joins sheet 39, Royal SE

Joins sheet 40, Greenville SW

Joins sheet 41, Greenville SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.


QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 21 | 22 | 23 |
| 30 | | 32 |
| 39 | 40 | 41 |

21 EVERLY SE
22 SPENCER SW
23 SPENCER SE
30 ROYAL NE
32 GREENVILLE NE
39 ROYAL SE
40 GREENVILLE SW
41 GREENVILLE SE

INDEX TO ADJOINING 3.75 MAPS

GREENVILLE NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 31 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 22, Spencer SW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 23, Spencer SE

CLAY COUNTY, IOWA
GREENVILLE NE QUADRANGLE
SHEET NUMBER 32 OF 63

Joins sheet 24, Dickens SW

95°11'15"     R. 37 W.   R. 36 W.     95°07'30"

43°07'30"     43°07'30"


Joins sheet 31, Greenville NW

Joins sheet 33, Gillett Grove NW

T. 95 N.   T. 96 N.

43°03'45"     43°03'45"

95°11'15"     R. 37 W.   R. 36 W.     95°07'30"

Joins sheet 40, Greenville SW

Joins sheet 41, Greenville SE

Joins sheet 42, Gillett Grove SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 22 | 23 | 24 |
| 31 | | 33 |
| 40 | 41 | 42 |

22 SPENCER SW
23 SPENCER SE
24 DICKENS SW
31 GREENVILLE NW
33 GILLETT GROVE NW
40 GREENVILLE SW
41 GREENVILLE SE
42 GILLETT GROVE SW

INDEX TO ADJOINING 3.75 MAPS

GREENVILLE NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 32 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
GILLETT GROVE NW QUADRANGLE
SHEET NUMBER 33 OF 63

Joins sheet 23, Spencer SE

Joins sheet 24, Dickens SW

Joins sheet 25, Dickens SE

95° 07′30″ R. 36 W. 95° 03′45″

43° 07′30″ 43° 07′30″

Joins sheet 32, Greenville NE


Joins sheet 34, Gillett Grove NE

T. 95 N. T. 96 N.

43° 03′45″ 43° 03′45″

95° 07′30″ R. 36 W. 95° 03′45″

Joins sheet 41, Greenville SE

Joins sheet 42, Gillett Grove SW

Joins sheet 43, Gillett Grove SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

| | | |
|---|---|---|
| 23 | 24 | 25 |
| 32 | | 34 |
| 41 | 42 | 43 |

23 SPENCER SE
24 DICKENS SW
25 DICKENS SE
32 GREENVILLE NE
34 GILLETT GROVE NE
41 GREENVILLE SE
42 GILLETT GROVE SW
43 GILLETT GROVE SE

INDEX TO ADJOINING 3.75 MAPS

GILLETT GROVE NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 33 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 24, Dickens SW

Joins sheet 25, Dickens SE

Joins sheet 26, Ruthven SW

Joins sheet 33, Gillett Grove NW

Joins sheet 35, Silver Lake NW

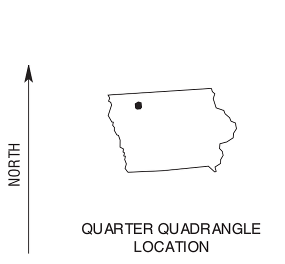

Joins sheet 42, Gillett Grove SW

Joins sheet 43, Gillett Grove SE

Joins sheet 44, Silver Lake SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 24 | 25 | 26 |
| 33 | | 35 |
| 42 | 43 | 44 |

24 DICKENS SW
25 DICKENS SE
26 RUTHVEN SW
33 GILLETT GROVE NW
35 SILVER LAKE NW
42 GILLETT GROVE SW
43 GILLETT GROVE SE
44 SILVER LAKE SW

INDEX TO ADJOINING 3.75 MAPS

# GILLETT GROVE NE, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 34 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SILVER LAKE NW QUADRANGLE
SHEET NUMBER 35 OF 63

Joins sheet 25, Dickens SE

Joins sheet 26, Ruthven SW

Joins sheet 27, Ruthven SE

95° 00′00″ 94° 56′15″

R. 35 W.

43° 07′30″

Joins sheet 34, Gillett Grove NE

T. 95 N. T. 96 N.

Joins sheet 36, Silver Lake NE

43° 03′45″

R. 35 W.

95° 00′00″ 94° 56′15″

Joins sheet 43, Gillett Grove SE

Joins sheet 44, Silver Lake SW

Joins sheet 45, Silver Lake SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 25 | 26 | 27 |
| 34 | | 36 |
| 43 | 44 | 45 |

25 DICKENS SE
26 RUTHVEN SW
27 RUTHVEN SE
34 GILLETT GROVE NE
36 SILVER LAKE NE
43 GILLETT GROVE SE
44 SILVER LAKE SW
45 SILVER LAKE SE

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SILVER LAKE NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 35 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 26, Ruthven SW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

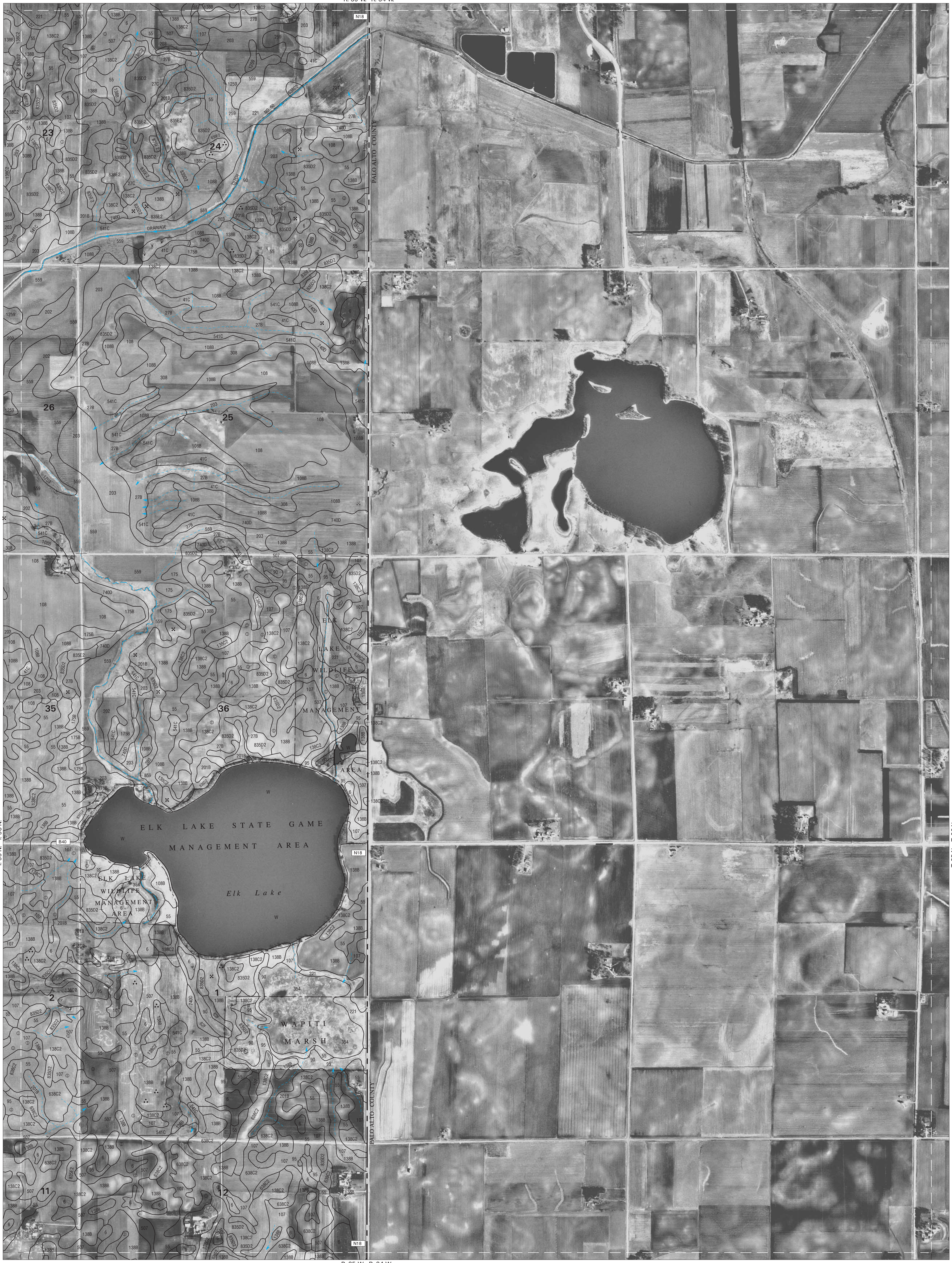
CLAY COUNTY, IOWA
SILVER LAKE NE QUADRANGLE
SHEET NUMBER 36 OF 63

Joins sheet 27, Ruthven SE

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

43° 07′30″ 43° 07′30″

Joins sheet 35, Silver Lake NW




43° 03′45″ 43° 03′45″

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

Joins sheet 44, Silver Lake SW

Joins sheet 45, Silver Lake SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| 26 | 27 | | 26 RUTHVEN SW<br>27 RUTHVEN SE |
|---|---|---|---|
| 35 | ■ | | 35 SILVER LAKE NW |
| 44 | 45 | | 44 SILVER LAKE SW<br>45 SILVER LAKE SE |

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## SILVER LAKE NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 36 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
HARTLEY SW SE QUADRANGLE
SHEET NUMBER 37 OF 63

Joins sheet 29, Royal NW

Joins sheet 28, Hartley SW NE

95° 26′15″ R. 39 W. R. 38 W. 95° 22′30″

43° 03′45″ 43° 03′45″


T. 95 N. T. 95 N.

Joins sheet 38, Royal SW

43° 00′00″ 43° 00′00″

95° 26′15″ R. 39 W. R. 38 W. 95° 22′30″

Joins sheet 46, Sutherland East NE

Joins sheet 47, Peterson NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| | 28 | 29 |
| | | 38 |
| | 46 | 47 |

28 HARTLEY SW NE
29 ROYAL NW
38 ROYAL SW
46 SUTHERLAND EAST NE
47 PETERSON NW

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HARTLEY SW SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 37 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
ROYAL SW QUADRANGLE
SHEET NUMBER 38 OF 63

Joins sheet 28, Hartley SW NE
Joins sheet 29, Royal NW
Joins sheet 30, Royal NE


Joins sheet 37, Hartley SW SE
Joins sheet 39, Royal SE
Joins sheet 46, Sutherland East NE
Joins sheet 47, Peterson NW
Joins sheet 48, Peterson NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 28 | 29 | 30 |
| 37 | | 39 |
| 46 | 47 | 48 |

28 HARTLEY SW NE
29 ROYAL NW
30 ROYAL NE
37 HARTLEY SW SE
39 ROYAL SE
46 SUTHERLAND EAST NE
47 PETERSON NW
48 PETERSON NE

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ROYAL SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 38 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
ROYAL SE QUADRANGLE
SHEET NUMBER 39 OF 63

Joins sheet 29, Royal NW

Joins sheet 30, Royal NE

Joins sheet 31, Greenville NW

95°18′45″ 95°15′00″

R. 38 W. R. 37 W.

43°03′45″ 43°03′45″

Joins sheet 38, Royal SW

T. 95 N. T. 95 N.

Joins sheet 40, Greenville SW


43°00′00″ 43°00′00″

95°18′45″ 95°15′00″

R. 38 W. R. 37 W.

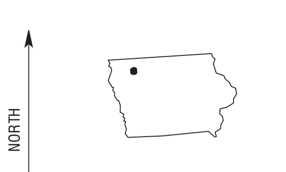
Joins sheet 47, Peterson NW

Joins sheet 48, Peterson NE

Joins sheet 49, Sioux Rapids NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 29 | 30 | 31 |
| 38 | | 40 |
| 47 | 48 | 49 |

29 ROYAL NW
30 ROYAL NE
31 GREENVILLE NW
38 ROYAL SW
40 GREENVILLE SW
47 PETERSON NW
48 PETERSON NE
49 SIOUX RAPIDS NW

INDEX TO ADJOINING 3.75 MAPS

ROYAL SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 39 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
GREENVILLE SW QUADRANGLE
SHEET NUMBER 40 OF 63

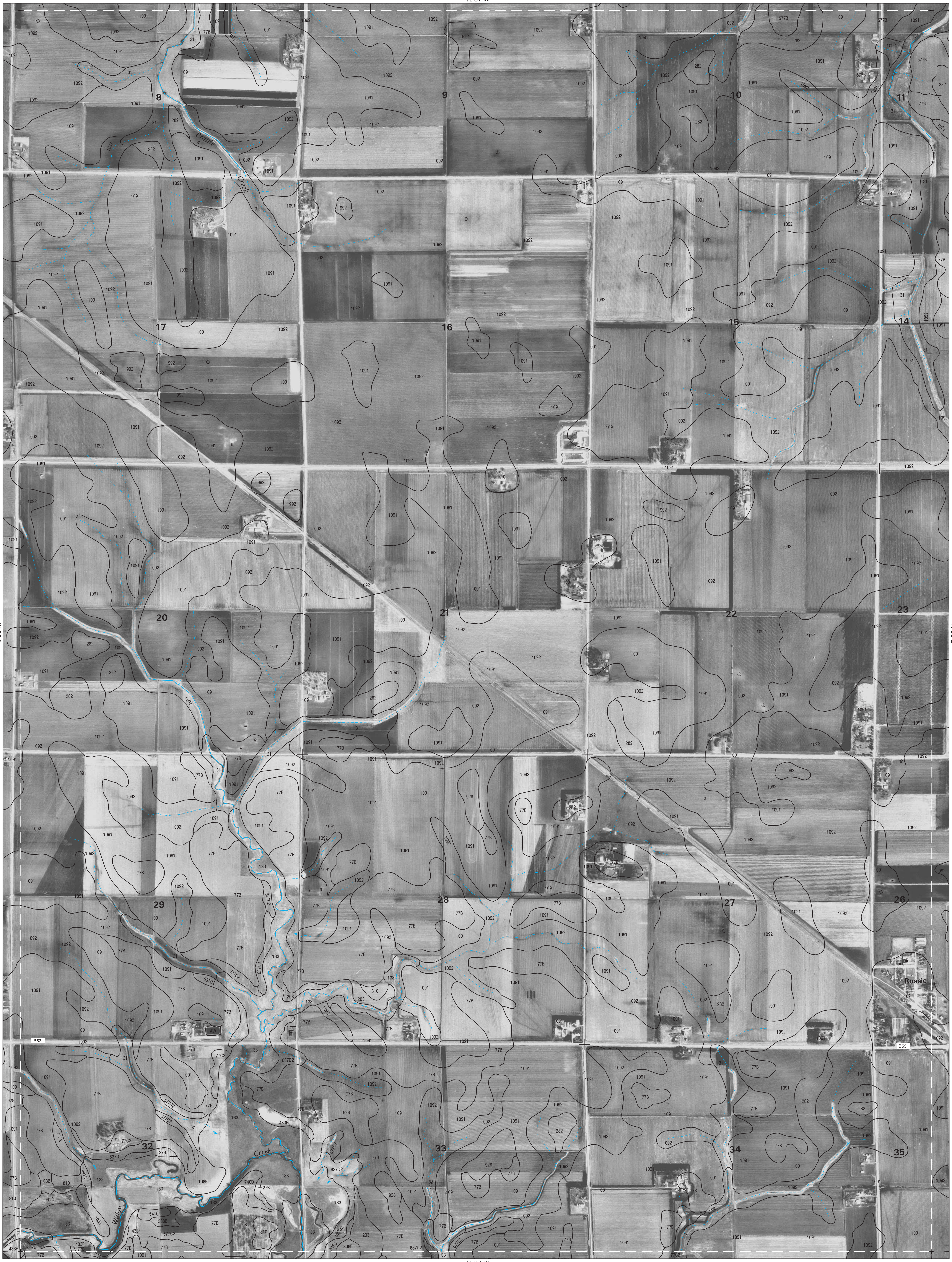
Joins sheet 30, Royal NE

Joins sheet 31, Greenville NW

Joins sheet 32, Greenville NE

95°15′00″ R. 37 W. 95°11′15″

43°03′45″ 43°03′45″




Joins sheet 39, Royal SE

T. 95 N.

Joins sheet 41, Greenville SE

43°00′00″ 43°00′00″

95°15′00″ R. 37 W. 95°11′15″

Joins sheet 48, Peterson NE

Joins sheet 49, Sioux Rapids NW

Joins sheet 50, Sioux Rapids NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 30 | 31 | 32 |
| 39 | | 41 |
| 48 | 49 | 50 |

30 ROYAL NE
31 GREENVILLE NW
32 GREENVILLE NE
39 ROYAL SE
41 GREENVILLE SE
48 PETERSON NE
49 SIOUX RAPIDS NW
50 SIOUX RAPIDS NE

INDEX TO ADJOINING 3.75 MAPS

GREENVILLE SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 40 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 32, Greenville NE

CLAY COUNTY, IOWA
GREENVILLE SE QUADRANGLE
SHEET NUMBER 41 OF 63




Joins sheet 50, Sioux Rapids NE

Joins sheet 49, Sioux Rapids NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 31 | 32 | 33 |
| 40 | | 42 |
| 49 | 50 | 51 |

31 GREENVILLE NW
32 GREENVILLE NE
33 GILLETT GROVE NW
40 GREENVILLE SW
42 GILLETT GROVE SW
49 SIOUX RAPIDS NW
50 SIOUX RAPIDS NE
51 WEBB NW

INDEX TO ADJOINING 3.75 MAPS

GREENVILLE SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 41 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 32, Greenville NE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 33, Gillett Grove NW

CLAY COUNTY, IOWA
GILLETT GROVE SW QUADRANGLE
SHEET NUMBER 42 OF 63

Joins sheet 34, Gillett Grove NE

95° 07′30″ | R. 36 W. | 95° 03′45″

43° 03′45″ | 43° 03′45″

Joins sheet 41, Greenville SE | T. 95 N. | T. 95 N. | Joins sheet 43, Gillett Grove SE


43° 00′00″ | 43° 00′00″

95° 07′30″ | R. 36 W. | 95° 03′45″

Joins sheet 50, Sioux Rapids NE

Joins sheet 51, Webb NW

Joins sheet 52, Webb NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 32 | 33 | 34 |
| 41 | | 43 |
| 50 | 51 | 52 |

32 GREENVILLE NE
33 GILLETT GROVE NW
34 GILLETT GROVE NE
41 GREENVILLE SE
43 GILLETT GROVE SE
50 SIOUX RAPIDS NE
51 WEBB NW
52 WEBB NE

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GILLETT GROVE SW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 42 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
GILLETT GROVE SE QUADRANGLE
SHEET NUMBER 43 OF 63

Joins sheet 33, Gillett Grove NW

Joins sheet 34, Gillett Grove NE

Joins sheet 35, Silver Lake NW

95° 03′ 45″

95° 00′ 00″

R. 36 W. R. 35 W.

43° 03′ 45″


Joins sheet 42, Gillett Grove SW

Joins sheet 44, Silver Lake SW

43° 00′ 00″

R. 36 W. R. 35 W.

95° 03′ 45″

95° 00′ 00″

Joins sheet 51, Webb NW

Joins sheet 52, Webb NE

Joins sheet 53, Rush Lake West NW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 33 | 34 | 35 |
| 42 | | 44 |
| 51 | 52 | 53 |

33 GILLETT GROVE NW
34 GILLETT GROVE NE
35 SILVER LAKE NW
42 GILLETT GROVE SW
44 SILVER LAKE SW
51 WEBB NW
52 WEBB NE
53 RUSH LAKE WEST NW

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GILLETT GROVE SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SILVER LAKE SW QUADRANGLE
SHEET NUMBER 44 OF 63

Joins sheet 34, Gillett Grove NE

Joins sheet 35, Silver Lake NW

Joins sheet 36, Silver Lake NE

95° 00′00″

R. 35 W.

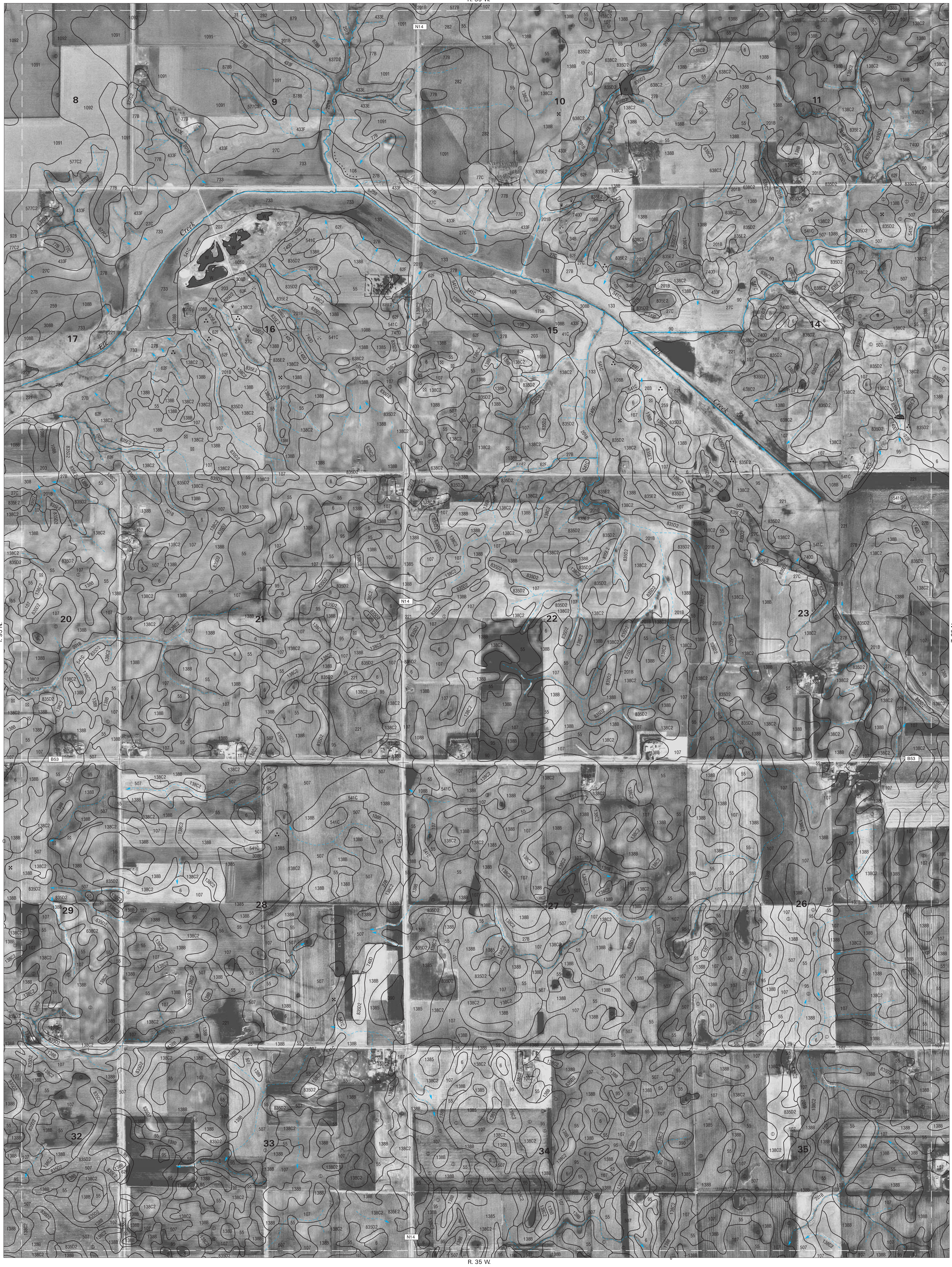
94° 56′15″

43° 03′45″

43° 03′45″

Joins sheet 43, Gillett Grove SE

T. 95 N.




T. 95 N.

Joins sheet 45, Silver Lake SE

43° 00′00″

43° 00′00″

95° 00′00″

R. 35 W.

94° 56′15″

Joins sheet 52, Webb NE

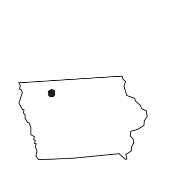
Joins sheet 53, Rush Lake West NW

Joins sheet 54, Rush Lake West NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 34 | 35 | 36 |
| 43 | | 45 |
| 52 | 53 | 54 |

34 GILLETT GROVE NE
35 SILVER LAKE NW
36 SILVER LAKE NE
43 GILLETT GROVE SE
45 SILVER LAKE SE
52 WEBB NE
53 RUSH LAKE WEST NW
54 RUSH LAKE WEST NE

INDEX TO ADJOINING 3.75 MAPS

## SILVER LAKE SW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 44 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 35, Silver Lake NW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Joins sheet 36, Silver Lake NE

CLAY COUNTY, IOWA
SILVER LAKE SE QUADRANGLE
SHEET NUMBER 45 OF 63

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

43° 03′45″


Joins sheet 44, Silver Lake SW

T. 95 N.

43° 00′00″

94° 56′15″ R. 35 W. R. 34 W. 94° 52′30″

Joins sheet 53, Rush Lake West NW

Joins sheet 54, Rush Lake West NE

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North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 35 | 36 | |
| 44 | | |
| 53 | 54 | |

35 SILVER LAKE NW
36 SILVER LAKE NE
44 SILVER LAKE SW
53 RUSH LAKE WEST NW
54 RUSH LAKE WEST NE

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SILVER LAKE SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 63

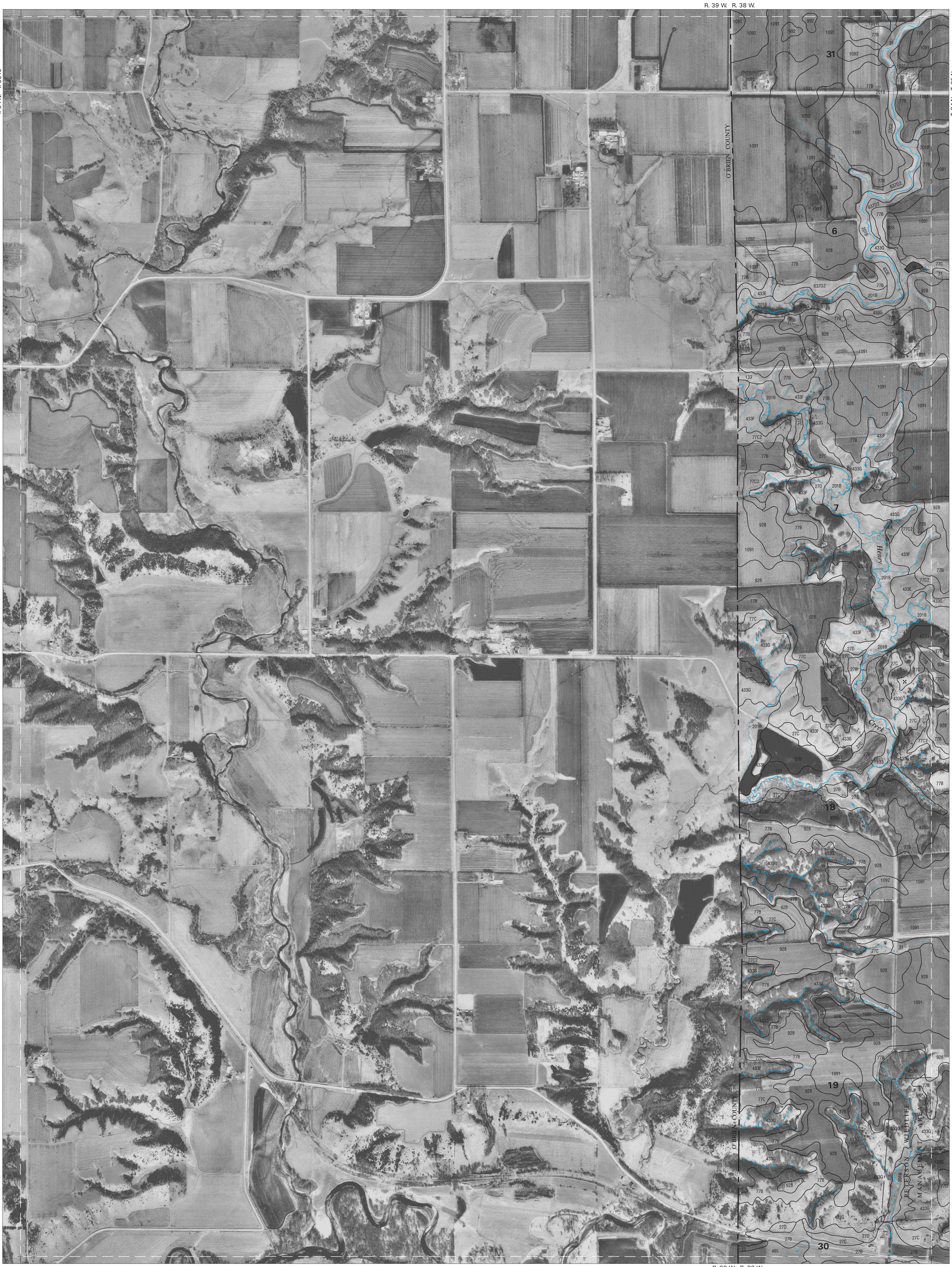
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SUTHERLAND EAST NE QUADRANGLE
SHEET NUMBER 46 OF 63

Joins sheet 38, Royal SW

Joins sheet 37, Hartley SW SE



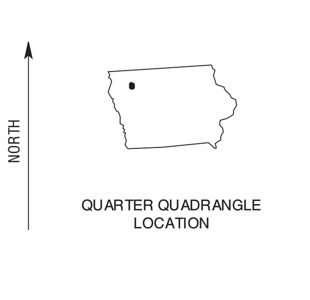

Joins sheet 47, Peterson NW

Joins sheet 55, Sutherland East SE

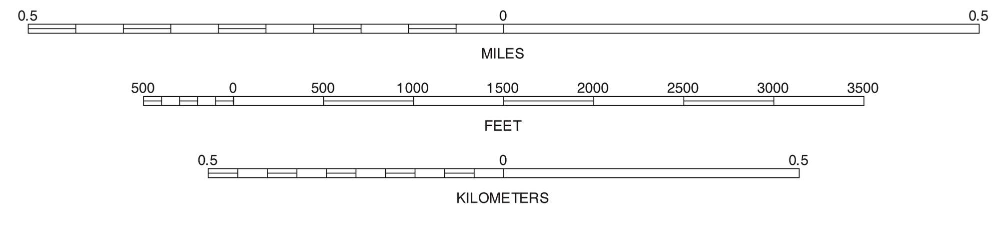
Joins sheet 56, Peterson SW

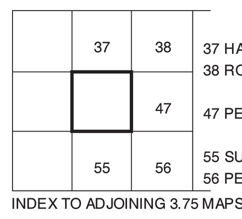
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




SCALE 1:12000




37 HARTLEY SW SE
38 ROYAL SW
47 PETERSON NW
55 SUTHERLAND EAST SE
56 PETERSON SW

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SUTHERLAND EAST NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 46 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
PETERSON NW QUADRANGLE
SHEET NUMBER 47 OF 63

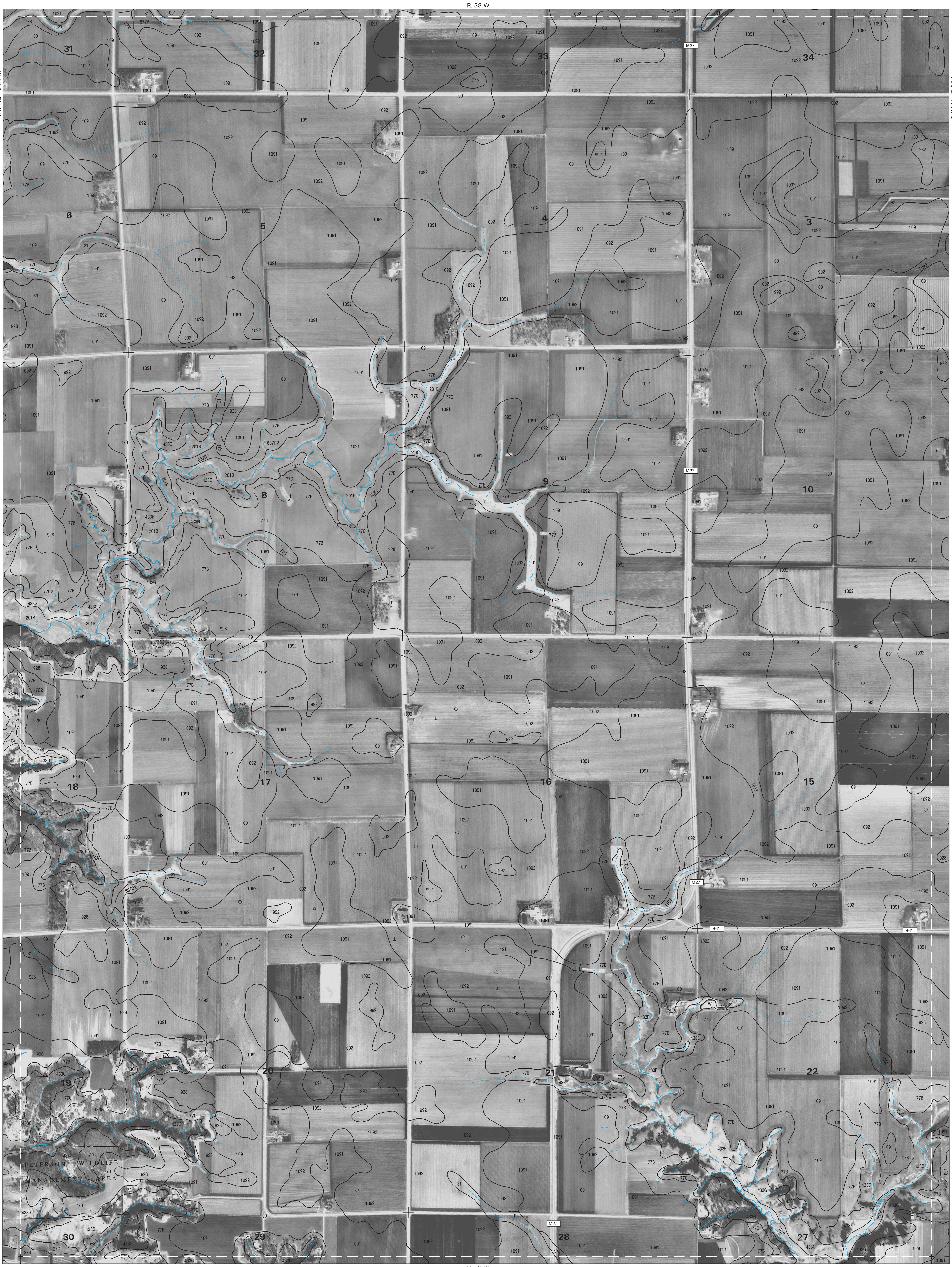
Joins sheet 37, Hartley SW SE

Joins sheet 38, Royal SW

Joins sheet 39, Royal SE

95° 22′30″ | R. 38 W. | 95°18′45″

43° 00′00″ | 43° 00′00″




Joins sheet 46, Sutherland East NE

Joins sheet 48, Peterson NE

42°56′15″ | R. 38 W. | 42°56′15″

95°22′30″ | 95°18′45″

Joins sheet 55, Sutherland East SE

Joins sheet 56, Peterson SW

Joins sheet 57, Peterson SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| 37 | 38 | 39 |
|---|---|---|
| 46 | | 48 |
| 55 | 56 | 57 |

INDEX TO ADJOINING 3.75 MAPS

37 HARTLEY SW SE
38 ROYAL SW
39 ROYAL SE
46 SUTHERLAND EAST NE
48 PETERSON NE
55 SUTHERLAND EAST SE
56 PETERSON SW
57 PETERSON SE

PETERSON NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 47 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
PETERSON NE QUADRANGLE
SHEET NUMBER 48 OF 63

Joins sheet 38, Royal SW

Joins sheet 39, Royal SE

Joins sheet 40, Greenville SW

95°18′45″ 95°15′00″

R. 38 W. R. 37 W.

43°00′00″ 43°00′00″

T. 94 N. T. 95 N.

Joins sheet 47, Peterson NW


Joins sheet 49, Sioux Rapids NW

42°56′15″ 42°56′15″

R. 38 W. R. 37 W.

95°18′45″ 95°15′00″

Joins sheet 56, Peterson SW

Joins sheet 57, Peterson SE

Joins sheet 58, Sioux Rapids SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 38 | 39 | 40 |
| 47 | | 49 |
| 56 | 57 | 58 |

38 ROYAL SW
39 ROYAL SE
40 GREENVILLE SW
47 PETERSON NW
49 SIOUX RAPIDS NW
56 PETERSON SW
57 PETERSON SE
58 SIOUX RAPIDS SW

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PETERSON NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 48 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SIOUX RAPIDS NW QUADRANGLE
SHEET NUMBER 49 OF 63

*Joins sheet 39, Royal SE*

*Joins sheet 40, Greenville SW*

*Joins sheet 41, Greenville SE*

95°15′00″ 95°11′15″

R. 37 W.

43°00′00″ 43°00′00″


*Joins sheet 48, Peterson NE*

*Joins sheet 50, Sioux Rapids NE*

42°56′15″ 42°56′15″

R. 37 W.

95°15′00″ 95°11′15″

*Joins sheet 57, Peterson SE*

*Joins sheet 58, Sioux Rapids SW*

*Joins sheet 59, Sioux Rapids SE*

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

| | | |
|---|---|---|
| 39 | 40 | 41 |
| 48 | | 50 |
| 57 | 58 | 59 |

39 ROYAL SE
40 GREENVILLE SW
41 GREENVILLE SE
48 PETERSON NE
50 SIOUX RAPIDS NE
57 PETERSON SE
58 SIOUX RAPIDS SW
59 SIOUX RAPIDS SE

INDEX TO ADJOINING 3.75 MAPS

# SIOUX RAPIDS NW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 49 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SIOUX RAPIDS NE QUADRANGLE
SHEET NUMBER 50 OF 63

Joins sheet 40, Greenville SW

Joins sheet 41, Greenville SE

Joins sheet 42, Gillett Grove SW

95°11'15" 43°00'00"

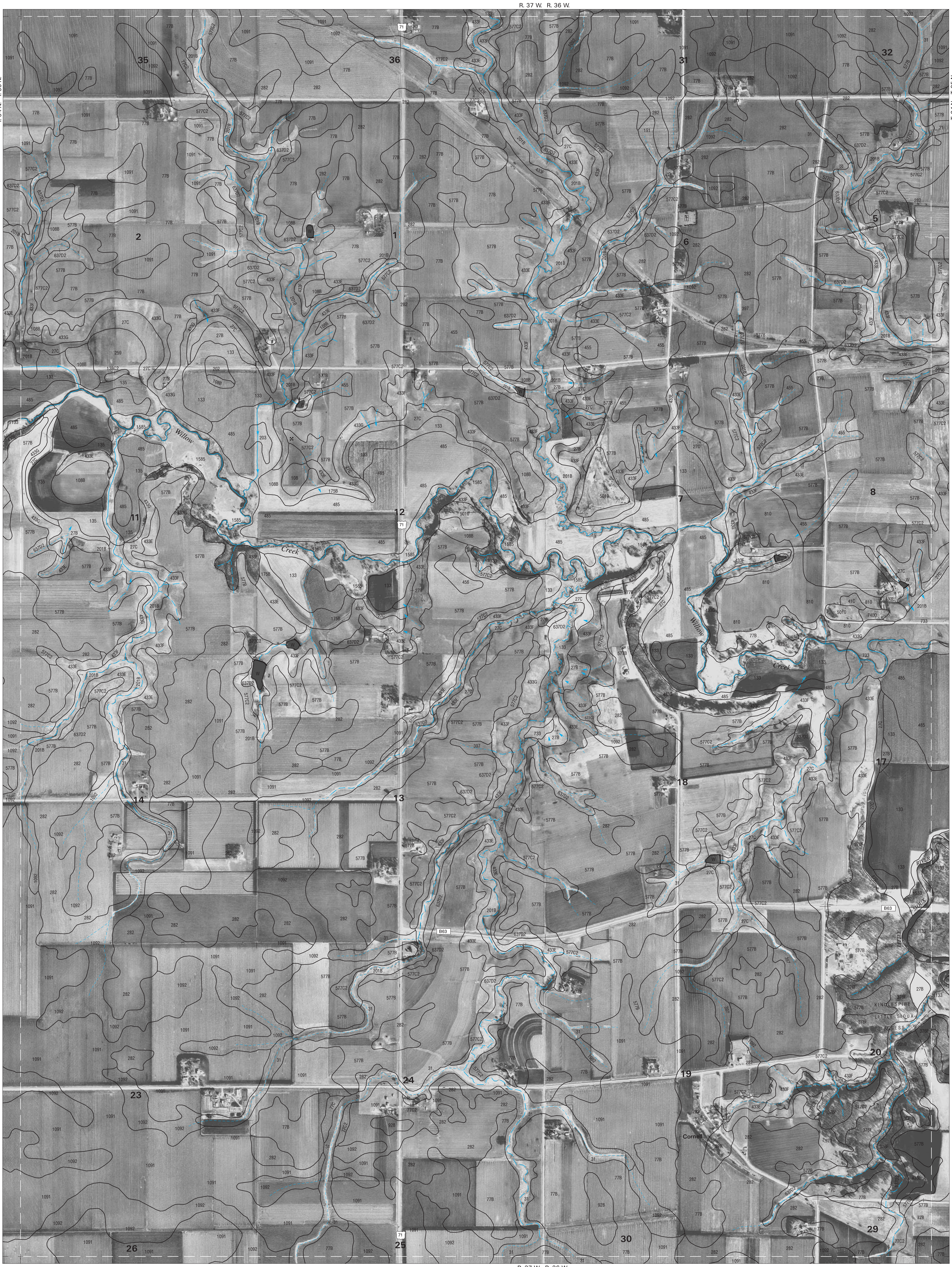
95°07'30" 43°00'00"

R. 37 W. R. 36 W.

T. 95 N. T. 94 N.

Joins sheet 49, Sioux Rapids NW

Joins sheet 51, Webb NW




42°56'15" 95°11'15"

42°56'15" 95°07'30"

R. 37 W. R. 36 W.

Joins sheet 58, Sioux Rapids SW

Joins sheet 59, Sioux Rapids SE

Joins sheet 60, Webb SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 40 | 41 | 42 |
| 49 | | 51 |
| 58 | 59 | 60 |

40 GREENVILLE SW
41 GREENVILLE SE
42 GILLETT GROVE SW
49 SIOUX RAPIDS NW
51 WEBB NW
58 SIOUX RAPIDS SW
59 SIOUX RAPIDS SE
60 WEBB SW

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# SIOUX RAPIDS NE, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 50 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
WEBB NW QUADRANGLE
SHEET NUMBER 51 OF 63

Joins sheet 41, Greenville SE

Joins sheet 42, Gillett Grove SW

Joins sheet 43, Gillett Grove SE

95° 07′30″ 95° 03′45″

R. 36 W.

43° 00′00″ 43° 00′00″

T. 94 N. T. 95 N.

42° 56′15″ 42° 56′15″

95° 07′30″ 95° 03′45″

R. 36 W.

Joins sheet 50, Sioux Rapids NE

Joins sheet 52, Webb NE

Joins sheet 59, Sioux Rapids SE

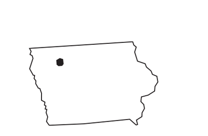
Joins sheet 60, Webb SW

Joins sheet 61, Webb SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 41 | 42 | 43 |
| 50 | | 52 |
| 59 | 60 | 61 |

41 GREENVILLE SE
42 GILLETT GROVE SW
43 GILLETT GROVE SE
50 SIOUX RAPIDS NE
52 WEBB NE
59 SIOUX RAPIDS SE
60 WEBB SW
61 WEBB SE

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WEBB NW, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 51 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
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CLAY COUNTY, IOWA
WEBB NE QUADRANGLE
SHEET NUMBER 52 OF 63


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

| 42 | 43 | 44 |
|---|---|---|
| 51 | | 53 |
| 60 | 61 | 62 |

42 GILLETT GROVE SW
43 GILLETT GROVE SE
44 SILVER LAKE SW
51 WEBB NW
53 RUSH LAKE WEST NW
60 WEBB SW
61 WEBB SE
62 RUSH LAKE WEST SW

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WEBB NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 52 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

*Joins sheet 43, Gillett Grove SE*

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

*Joins sheet 44, Silver Lake SW*

CLAY COUNTY, IOWA
RUSH LAKE WEST NW QUADRANGLE
SHEET NUMBER 53 OF 63

*Joins sheet 45, Silver Lake SE*

95° 00′00″ | 94° 56′15″

43° 00′00″ | 43° 00′00″

R. 35 W.

T. 94 N. T. 95 N.


*Joins sheet 52, Webb NE*

*Joins sheet 54, Rush Lake West NE*

42° 56′15″ | 42° 56′15″

R. 35 W.

95° 00′00″ | 94° 56′15″

*Joins sheet 61, Webb SE*

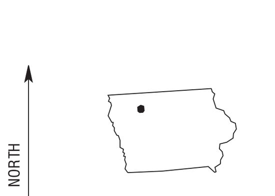
*Joins sheet 62, Rush Lake West SW*

*Joins sheet 63, Rush Lake West SE*

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 43 | 44 | 45 |
| 52 | | 54 |
| 61 | 62 | 63 |

43 GILLETT GROVE SE
44 SILVER LAKE SW
45 SILVER LAKE SE
52 WEBB NE
54 RUSH LAKE WEST NE
61 WEBB SE
62 RUSH LAKE WEST SW
63 RUSH LAKE WEST SE

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# RUSH LAKE WEST NW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 53 OF 63

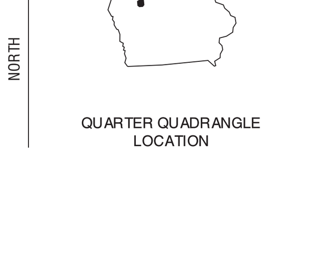
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

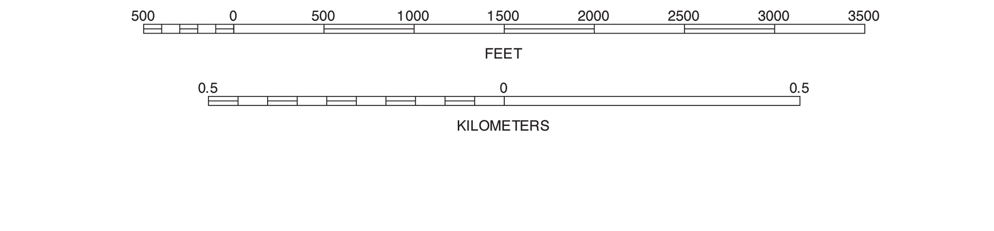
CLAY COUNTY, IOWA
RUSH LAKE WEST NE QUADRANGLE
SHEET NUMBER 54 OF 63


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




SCALE 1:12000




| | | | |
|---|---|---|---|
| 44 | 45 | | 44 SILVER LAKE SW<br>45 SILVER LAKE SE |
| 53 | ■ | | 53 RUSH LAKE WEST NW |
| 62 | 63 | | 62 RUSH LAKE WEST SW<br>63 RUSH LAKE WEST SE |

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RUSH LAKE WEST NE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 54 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SUTHERLAND EAST SE QUADRANGLE
SHEET NUMBER 55 OF 63

*Joins sheet 46, Sutherland East NE*

*Joins sheet 47, Peterson NW*


*Joins sheet 56, Peterson SW*

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

46 47
56

46 SUTHERLAND EAST NE
47 PETERSON NW
56 PETERSON SW

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SUTHERLAND EAST SE, IOWA
3.75 MINUTE SERIES
SHEET NUMBER 55 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
PETERSON SW QUADRANGLE
SHEET NUMBER 56 OF 63

Joins sheet 46, Sutherland East NE

Joins sheet 47, Peterson NW

Joins sheet 48, Peterson NE


Joins sheet 55, Sutherland East SE

Joins sheet 57, Peterson SE

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North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

| | | |
|---|---|---|
| 46 | 47 | 48 |
| 55 | | 57 |
| | | |

46 SUTHERLAND EAST NE
47 PETERSON NW
48 PETERSON NE
55 SUTHERLAND EAST SE
57 PETERSON SE

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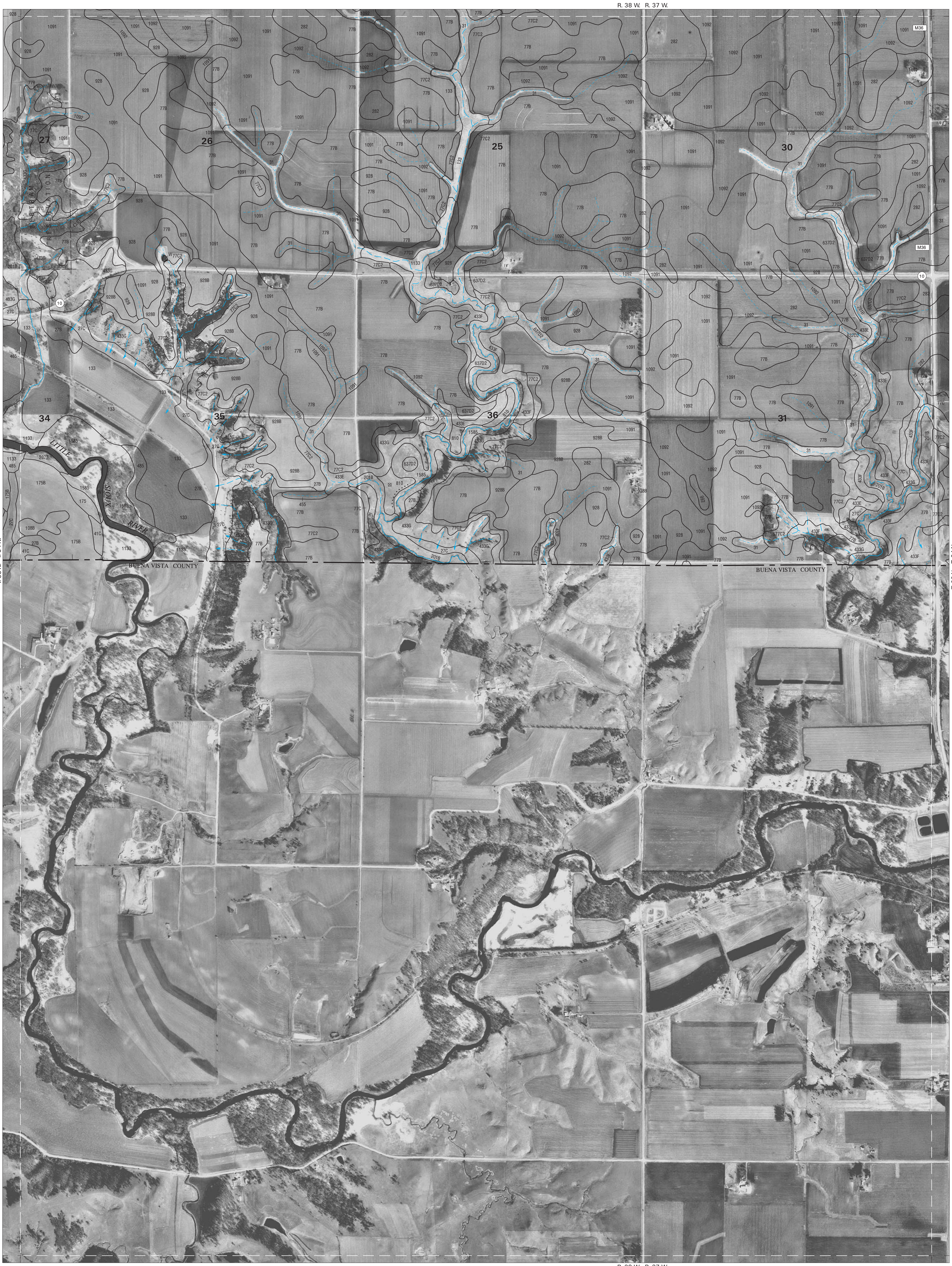
# PETERSON SW, IOWA

3.75 MINUTE SERIES
SHEET NUMBER 56 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
PETERSON SE QUADRANGLE
SHEET NUMBER 57 OF 63




This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

| 47 | 48 | 49 |
|---|---|---|
| 56 | | 58 |
| | | |

47 PETERSON NW
48 PETERSON NE
49 SIOUX RAPIDS NW
56 PETERSON SW
58 SIOUX RAPIDS SW

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PETERSON SE, IOWA
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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CLAY COUNTY, IOWA
SIOUX RAPIDS SW QUADRANGLE
SHEET NUMBER 58 OF 63

Joins sheet 48, Peterson NE

Joins sheet 49, Sioux Rapids NW

Joins sheet 50, Sioux Rapids NE

95°15′00″ R. 37 W. 95°11′15″

42°56′15″ 42°56′15″


42°52′30″ 42°52′30″

R. 37 W.

95°15′00″ 95°11′15″

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 15.
Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| | | |
|---|---|---|
| 48 | 49 | 50 |
| 57 | | 59 |
| | | |

48 PETERSON NE
49 SIOUX RAPIDS NW
50 SIOUX RAPIDS NE
57 PETERSON SE
59 SIOUX RAPIDS SE

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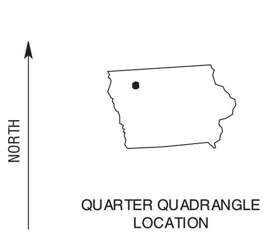
CLAY COUNTY, IOWA
SIOUX RAPIDS SE QUADRANGLE
SHEET NUMBER 59 OF 63

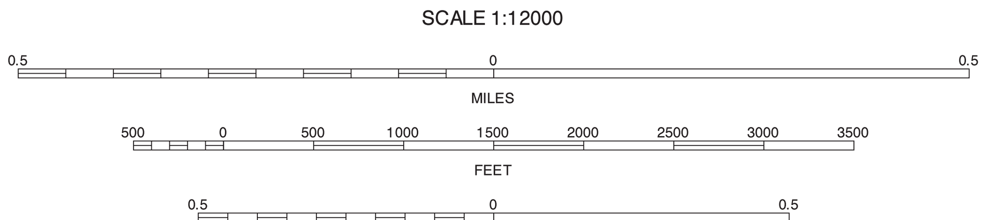

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

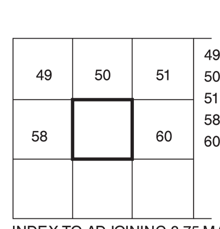
North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000




49 SIOUX RAPIDS NW
50 SIOUX RAPIDS NE
51 WEBB NW
58 SIOUX RAPIDS SW
60 WEBB SW

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

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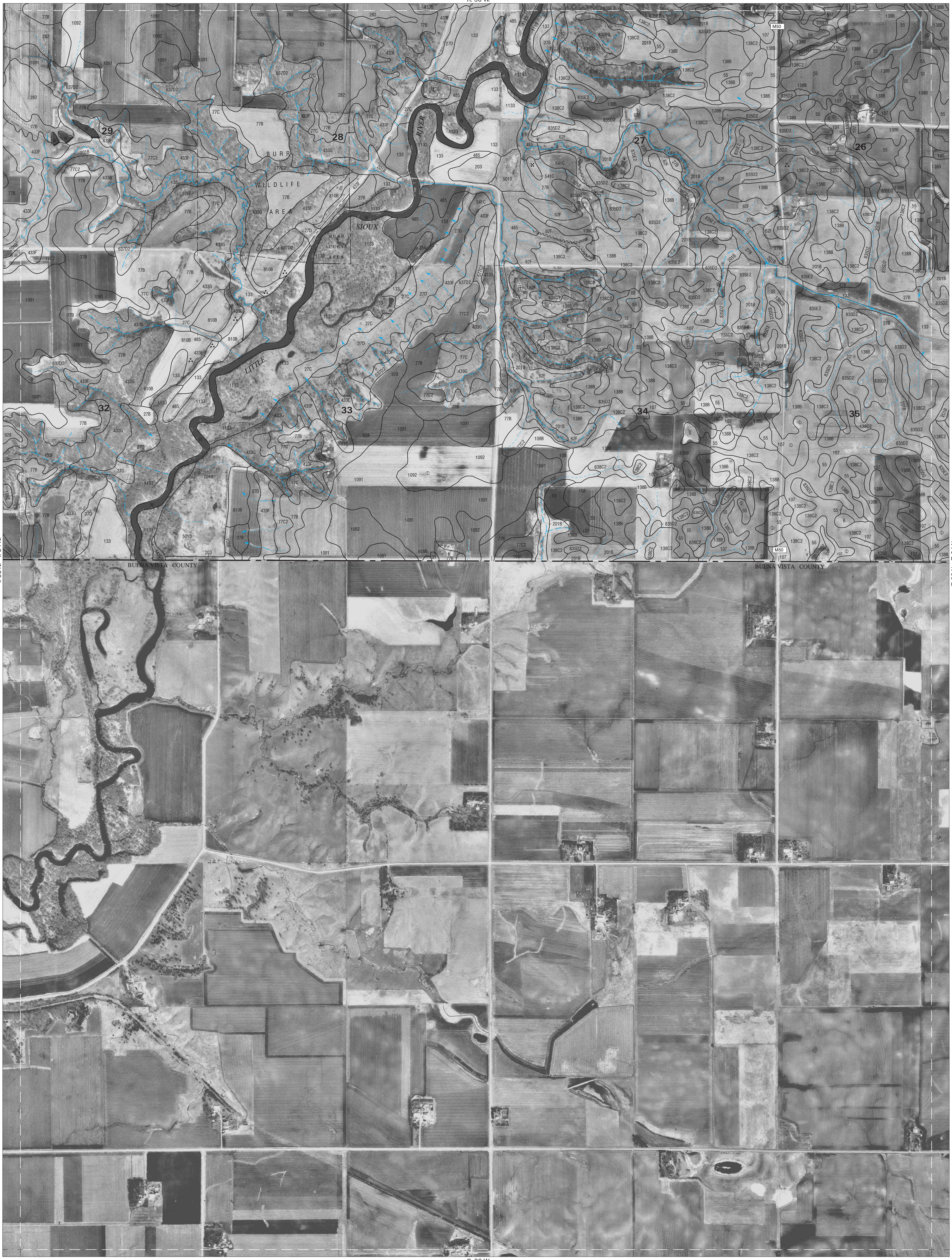
CLAY COUNTY, IOWA
WEBB SW QUADRANGLE
SHEET NUMBER 60 OF 63

Joins sheet 50, Sioux Rapids NE
Joins sheet 51, Webb NW
Joins sheet 52, Webb NE




Joins sheet 59, Sioux Rapids SE
Joins sheet 61, Webb SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

| | | |
|---|---|---|
| 50 | 51 | 52 |
| 59 | | 61 |

50 SIOUX RAPIDS NE
51 WEBB NW
52 WEBB NE
59 SIOUX RAPIDS SE
61 WEBB SE

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

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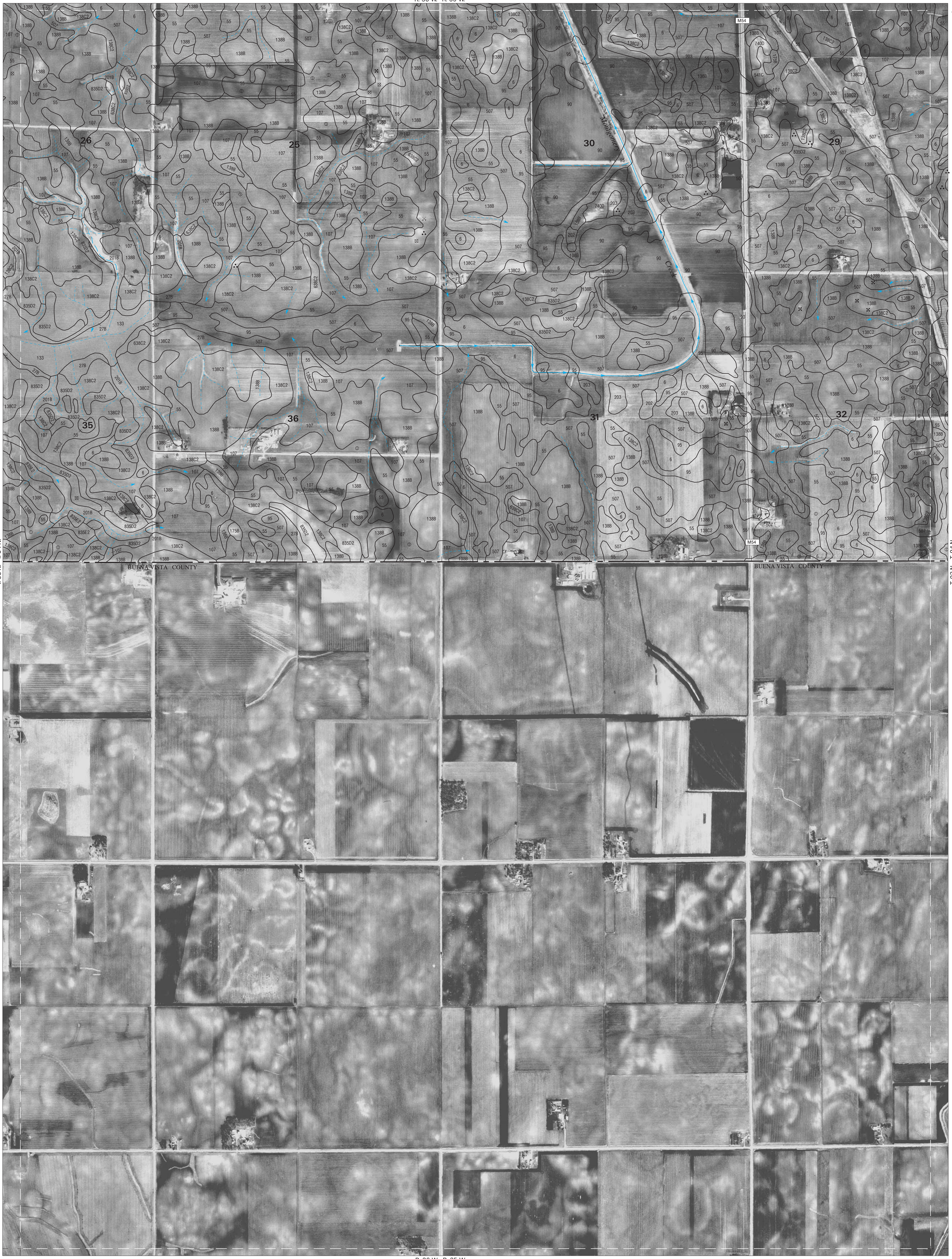
Joins sheet 51, Webb NW

Joins sheet 52, Webb NE

Joins sheet 53, Rush Lake West NW

95° 03′45″ R. 36 W. R. 35 W. 95° 00′00″

42° 56′15″




T. 94 N. T. 93 N.

Joins sheet 60, Webb SW

Joins sheet 62, Rush Lake West SW

42° 52′30″

95° 03′45″ R. 36 W. R. 35 W. 95° 00′00″

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

| | | |
|---|---|---|
| 51 | 52 | 53 |
| 60 | | 62 |
| | | |

51 WEBB NW
52 WEBB NE
53 RUSH LAKE WEST NW
60 WEBB SW
62 RUSH LAKE WEST SW

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## WEBB SE, IOWA

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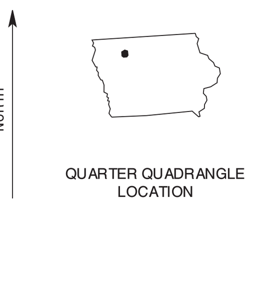
CLAY COUNTY, IOWA
RUSH LAKE WEST SW QUADRANGLE
SHEET NUMBER 62 OF 63


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1990 and 1991 aerial photography. Public land survey system (PLSS) information and culture annotation were acquired from the U.S. Geological Survey. The hydrography layer was developed jointly in the soil mapping effort by field soil scientists. The cultural content and hydrography layer were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 15. Coordinate grid ticks and land division data, if shown, are approximately positioned.




QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

| 52 | 53 | 54 |
| --- | --- | --- |
| 61 | | 63 |
| | | |

52 WEBB NE
53 RUSH LAKE WEST NW
54 RUSH LAKE WEST NE
61 WEBB SE
63 RUSH LAKE WEST SE

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Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 53, Rush Lake West NW

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Joins sheet 54, Rush Lake West NE

# CLAY COUNTY, IOWA
RUSH LAKE WEST SE QUADRANGLE
SHEET NUMBER 63 OF 63

94°56′15″  R. 35 W.  R. 34 W.  94°52′30″

42°56′15″  42°56′15″


T. 94 N.  T. 93 N.  T. 94 N.  T. 93 N.

Joins sheet 62, Rush Lake West SW

42°52′30″  42°52′30″

94°56′15″  R. 35 W.  R. 34 W.  94°52′30″

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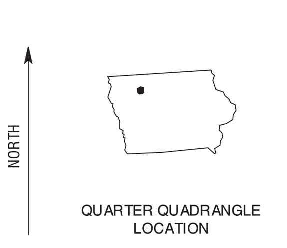
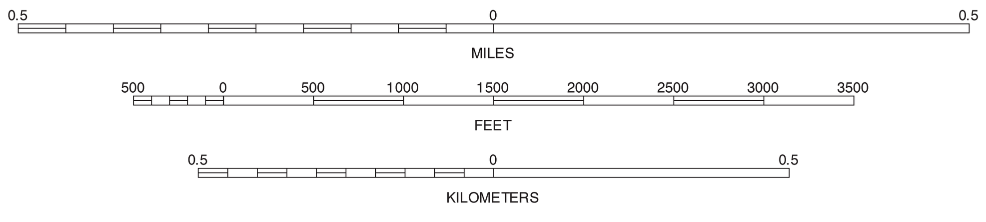
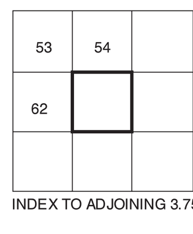



QUARTER QUADRANGLE LOCATION

SCALE 1:12000




53 RUSH LAKE WEST NW
54 RUSH LAKE WEST NE
62 RUSH LAKE WEST SW

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## RUSH LAKE WEST SE, IOWA
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